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VOLUME XVI. NUMBER 2.

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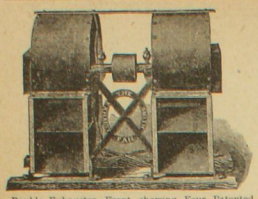
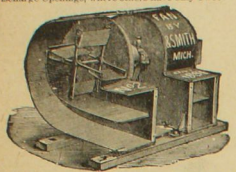


Double Exhauster—Front, showing Four Patented Discharge Openings, where others have only Two.



Section showing TWO Patent DISCHARGE CHAMBERS for EACH Fan Wheel, where others have only One.

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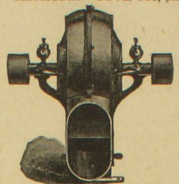

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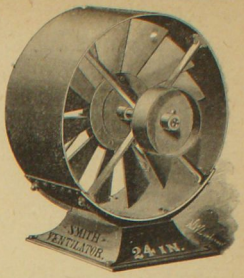

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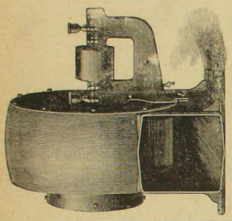

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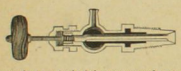

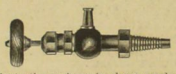

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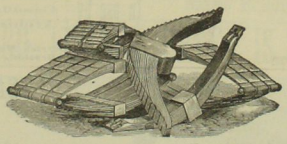

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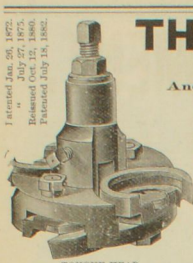

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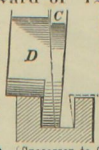

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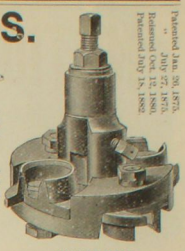

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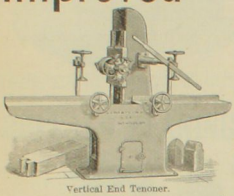

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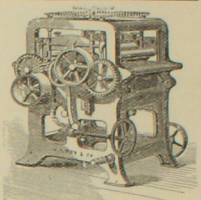

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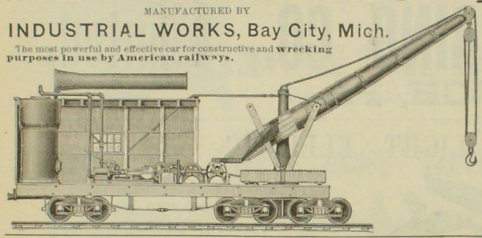

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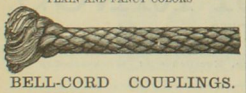

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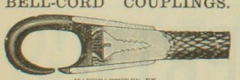

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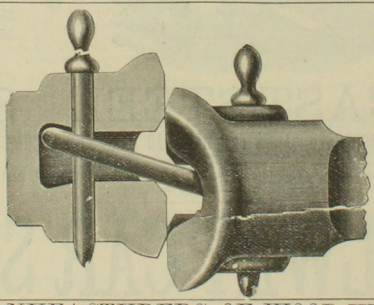

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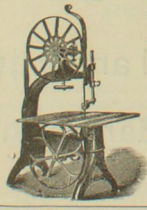

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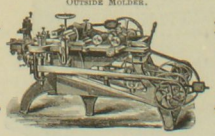

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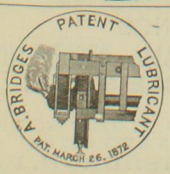

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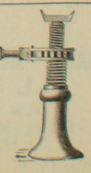

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NATIONAL CAR-BUILDER SUPPLEMENT.

At the request of prominent Railroad officials and others, we commenced FIVE years ago the compilation of accurate lists of American Manufacturers of Railroad Rolling Stock and Materials, published them in the form of a Supplement to the NATIONAL CAR-BUILDER, and distributed it gratuitously to every official in the Purchasing and Mechanical Departments of every Railroad in the United States, Canada, Mexico, Central and South America, West Indies, Australia New, Zealand, and such other foreign countries as could buy Railroad Material in the United States with advantage. Although the undertaking involved an amount of labor and expense that was not anticipated, the outlay was fully warranted by the very flattering reception it received by Railroad men and the business community generally.

We are now preparing the **FIFTH ANNUAL "SUPPLEMENT,"** and it will contain as follows:

Complete lists of every Car and Locomotive Builder, Axle, Car Wheel, and Car Spring Manufacturer in the United States and Canada.

All the Rail Mills of the country.

Complete lists of the STREET RAILROADS in the United States and Canada, their Gauge, Weight of Rail, Mileage, number of Cars and Horses, Officers' Names and Addresses.

The Railroads (both Steam and Street) in Mexico, Central and South America and the West Indies, with the Gauge, Weight of Rail, Mileage, Number of Cars and Locomotives, Officers' Names and Addresses, etc.

This is the only publication that has ever given this information.

It will be distributed *gratuitously* to every person whose name appears in the paper, and in addition will be sent to every General Manager, Superintendent, Purchasing Agent, Chief Engineer, Master Mechanic, Master Car-Builder and Road Master of all Railroads in the United States and Canada.

The Supplement is the ONLY ADVERTISING MEDIUM which reaches all the Street Railroad Officers, and is the BEST and CHEAPEST means of reaching Railroad Officers in adjacent foreign countries.

It is the experience of the publishers, during the past five years, that Railroad men and others keep the "Supplement" on their desks or hung near at hand throughout the year for reference, not only for the lists, but for the advertisements, which form a conveniently indexed collection of trade circulars of nearly TWO HUNDRED of the best and most responsible manufacturers of railroad material, a collection not to be obtained in any other way.

As to its value as an Advertising Medium, we respectfully refer to a few of the prominent manufacturers who have used its pages, as follows:

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Rogers, C. B. & Co., Wood Working Machinery, Norwich, Conn.
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One full page, 14 inches deep and 9½ inches wide, $125; Three-quarters of page, $100; Half page, $75; Quarter page, $50; smaller spaces, $10 for first inch, and $5 for each additional inch (single column).

For further particulars address **NATIONAL CAR-BUILDER "SUPPLEMENT,"**
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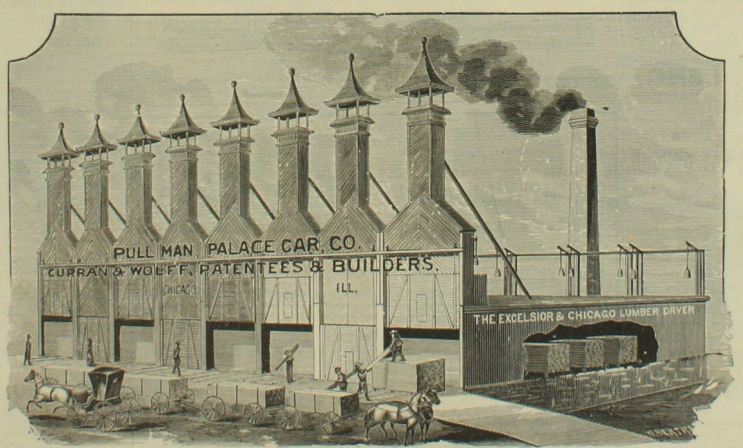
PAYS FOR ITSELF EVERY YEAR. Storing Capacity, 40,000 Feet Inch Lumber.



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Denver & Rio Grande R. R., Denver, Col	2	Wells & French Co., Car Builders, Chicago	3	Ensign Mfg. Co., Car-Builders, Huntington, W. Va	3
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Memphis & Charleston R. R. Co., Memphis, Tenn	1	Jackson & Sharpe Co., Car-Builders, Wilmington, Del	2	Lafayette Car Works, Lafayette, Ind	2

Tabulated report of work done by the Excelsior and Chicago Dry Kilns for the Pullman Palace Car Company:

	Feet.
Week ending Oct. 4th, 1884, 32 kilns dried	280,361
" " Oct. 11th, 1884, 30 " "	353,552
" " Oct. 18th, 1884, 45 " "	426,302
116	1,060,215

Average for each kiln per day for 3 weeks, allowing 5¼ days to the week, 9,139 91-116 feet.
J. W. SMITH, for Curran & Wolff.
P. H. GILMARTIN, Foreman of Lumber Yard.

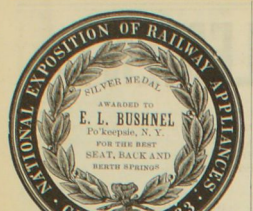
PULLMAN'S PALACE CAR COMPANY,
PULLMAN, Ill., Nov. 28, 1884.

Messrs. Curran & Wolff, Chicago, Ill.:

DEAR SIRS: Replying to your favor of the 18th inst., allow me to say, 1st, That I am very much pleased with your superintendent and the alterations he has made on your Dry Kilns here. 2d, That the Kilns are working much more satisfactorily, drying a greater amount of lumber than before, and at a less cost. 3d, That the report of our own Lumber Yard Foreman agrees with that of your Superintendent. 4th. That while your Kilns give excellent satisfaction, I am not prepared to say that they are the be-t and most economical Kilns in use, because there are a great many Kilns with which I have had no experience.

Very truly yours,
W. E. BARROWS, Manager.

CURRAN & WOLFF, Proprietors and Builders, 39 and 41 FRANKLIN STREET, CHICAGO, ILL.



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Important to Railroad Managers and Master Mechanics.

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More perfect lubrication insured, and entire free dom guaranteed from corrosion of cylinders and de- sa- ction of steam joints by fatty acids.
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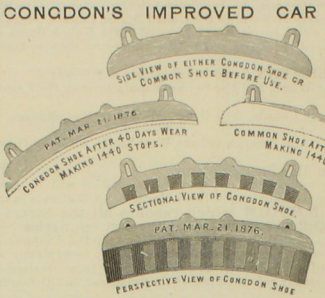

This shoe, while being more effective, in that greater uniformity of friction can be obtained when applied to the wheels of a train in motion without stopping the revolution of any till the train is at rest, exceeds in life, or the durability of the Shoe itself, that of the cast iron shoe by over seventy-five per cent.

Its durability, together with cheapness and simplicity of construction, recommend it in preference to any other in use.

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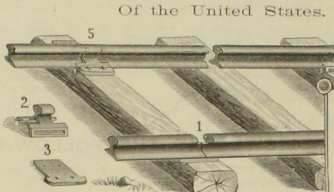
Of the United States.



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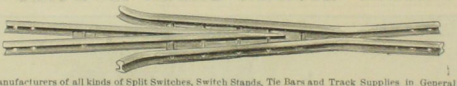

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No. 1, opens 2 in..... $7.50
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Sold by Leading Hardware Dealers.

The new Clamp represented in the above cut, on account of combining the qualities of quick adjustment and durability, recommends itself as the most practical tool of the kind ever offered in the market. It has the especial advantage over all others in clamping the work without displacement, being so constructed that in operating the plunger or screw it does not turn as in all other clamps, but is forced directly on the work by the thumb-screw.
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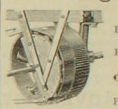

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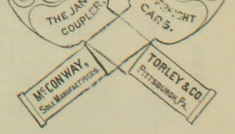

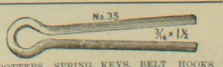

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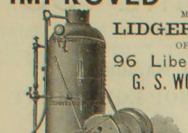

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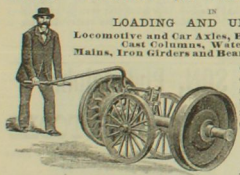

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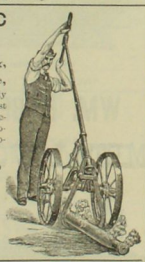

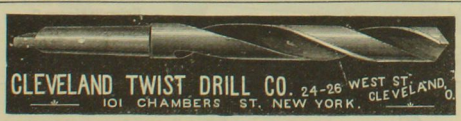

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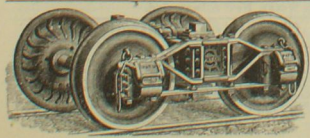

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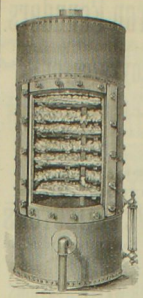

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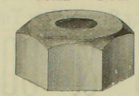

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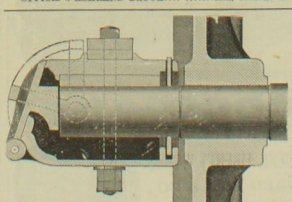

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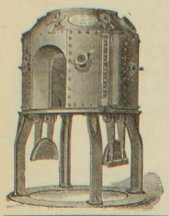

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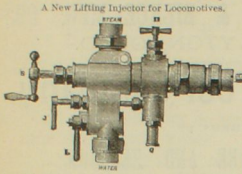

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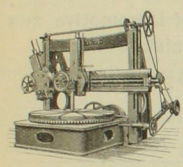

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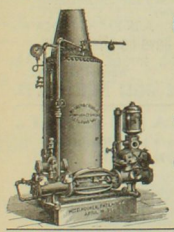

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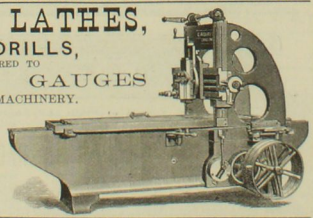

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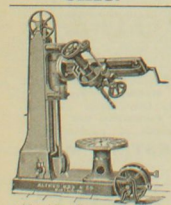

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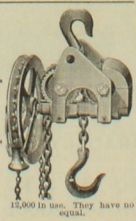

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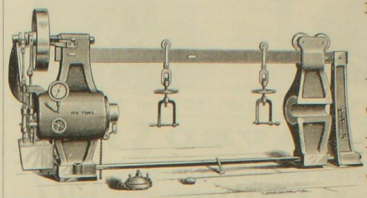

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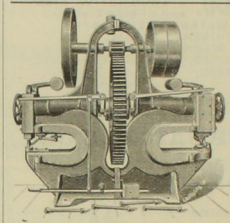

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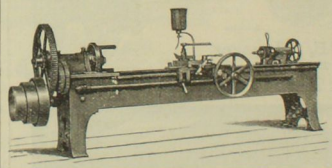

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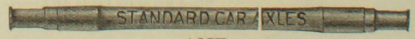

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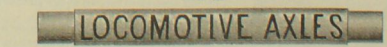

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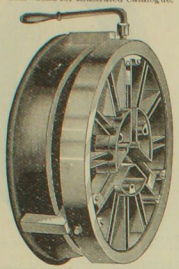

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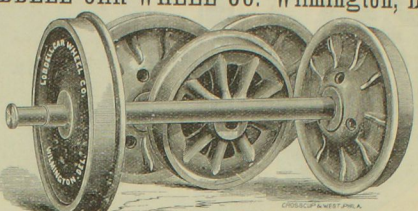

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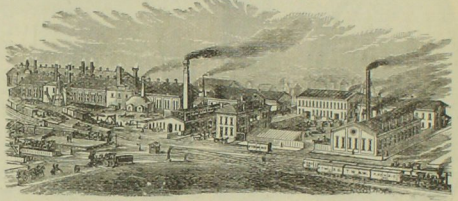

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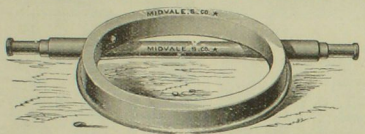

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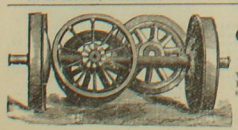

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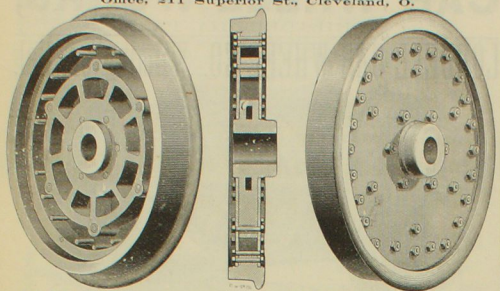

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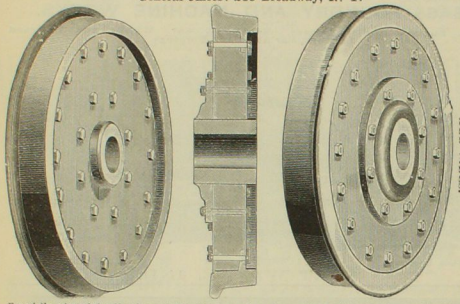

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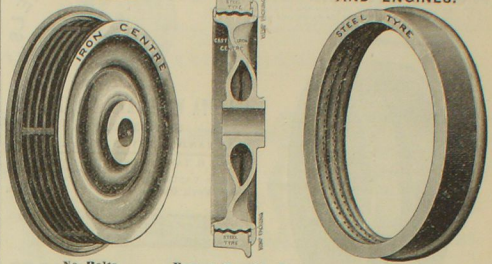

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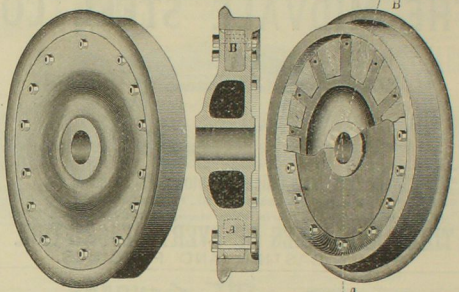

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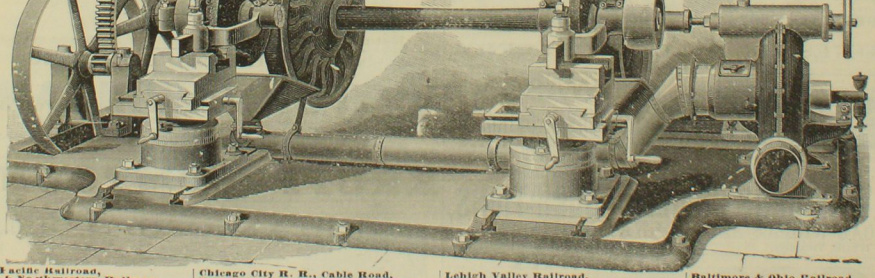
Wheels with flat places, and otherwise badly worn, that are ordinarily condemned and used for scrap iron, can be ground and fitted so as to double their original mileage. This alone makes our machine the greatest money saver ever introduced to railroads.

A sound Chilled Car Wheel trued by our method cannot be excelled by a paper or any other description of Car Wheel with steel tire.

Any person having a slight acquaintance with tools may, after five hours' instruction, become thoroughly competent to operate our machine.

Allowing all new wheels to be 3-32 inch oval, if properly fitted to axles, our machine *will* true up one pair an hour.

We manufacture expressly for use with our machine, Abrading Wheels, which, as the result of a series of experiments and long experience, we guarantee to be the best grinding wheels made. No odor, no glaze, and we defy competition.



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Canadian Pacific Railroad (Vale B. C.),
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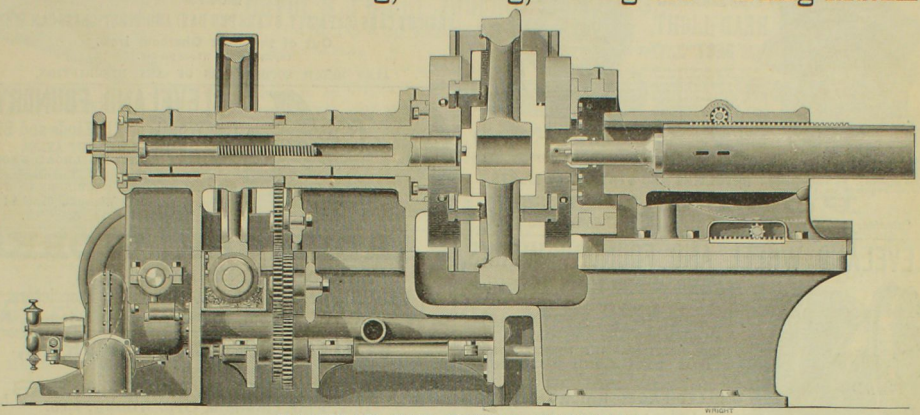
We are prepared to sell machines outright, or to furnish them on royalty for each pair of wheels trued.

THE ALLENTOWN ROLLING MILLS, Allentown, Pa., Manufacturers and Financial Agents East of the Mississippi River.

NORTH STAR IRON WORKS CO., Minneapolis, Minn., Manufacturers and Financial Agents West of the Mississippi River.

Combination Car Wheel Boring, Grinding, Truing and Turning Machine.



RAILWAY CAR WHEEL ECONOMY.

The long-felt want of a machine having greater capacity and accuracy for operating upon every construction, "including new and worn wheels withdrawn from service," is herewith represented, and will be placed for parties ordering the same upon a guarantee in writing. After a test, should it fail to have greater capacity and accuracy than *any* other tool, we agree to *remove it free of charge.*

It will bore the axle seat, turn the tread and flange of any steel or steel-tired wheel simultaneously.

It will centre any steel or steel-tired wheel by its already bored axle seat, turn the tread and flange in less time than any tool in existence.

It will *bore* and *true* a chilled iron wheel in less time, removing less chill therefrom, than any tool or system of tools for such purpose.

It is built first-class, well proportioned for its work and occupying a floor space of 10 × 7 feet.

GUARANTEED CAPACITY IN 10 HOURS:

No. 30.—New Chilled Iron Wheels, 33 inches diameter, bored, ground and paired if ¼ inch defective.
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No. 6.—Worn Steel or Steel-tired Wheels, 33 inches diameter, centered, turned and paired if ⅛ inch defective, tread and flange.
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Special Abrading Wheels of Superior Quality, for Chilled Iron Surface, Car-Wheel Grinding and General Shop Use Guaranteed.

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The signals are all given audibly on the Locomotive by the opening of a normally closed circuit, are thoroughly automatic in their operation, and signal danger when out of order from accident or malevolence. The signal, once given, sounds continuously until stopped by the engineer. **No Batteries are used on the Locomotive, nor on the line, nor any mechanism requiring to be wound or adjusted.** These signals give absolute safety under all conditions where carelessness and inattention to visual signals result in accident. Examination solicited and proofs of actual working given. Descriptive pamphlets sent.

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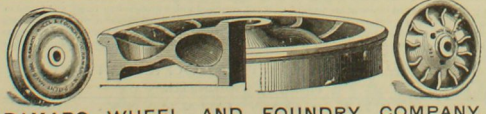

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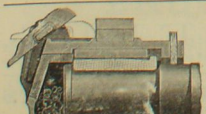

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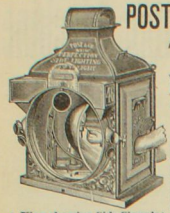

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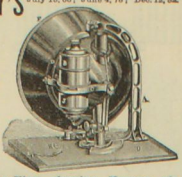

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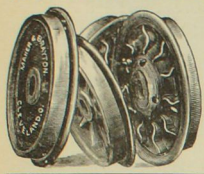

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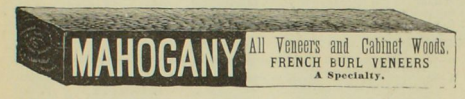

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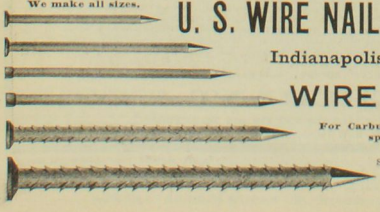

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Capacity, 50 Car Wheels per day.

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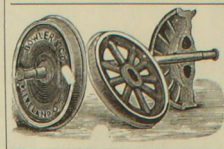

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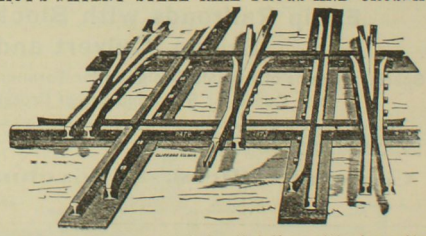

These Frogs and Crossings are made of steel rail, combined with a wrought-iron frame, and bound together transversely with strong bolts, which gives them great strength and durability without destroying their elasticity. They are connected at all ends by Fish-Plate Joints, and lie on the same tie surface as the running rail without any cutting of ties, thus saving a great deal of time and labor in putting in place on track.

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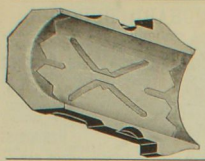

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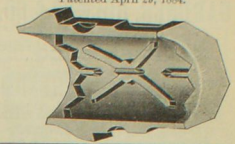

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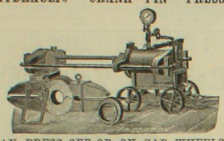

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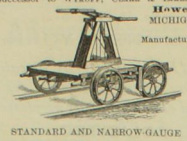

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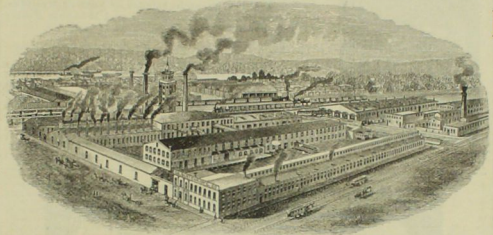

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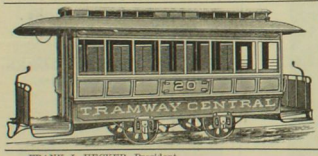

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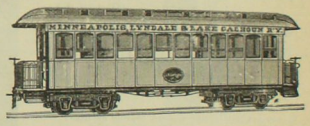

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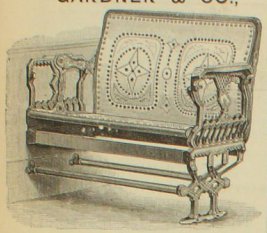

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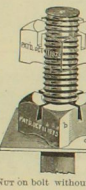

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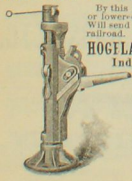

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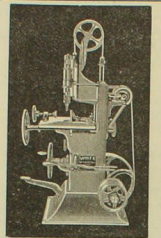

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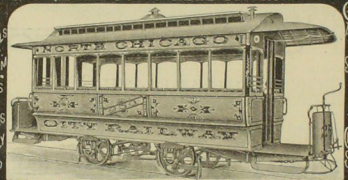

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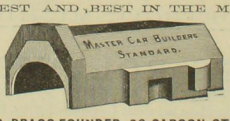

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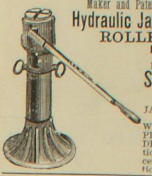

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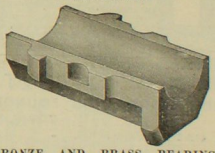

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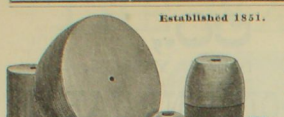

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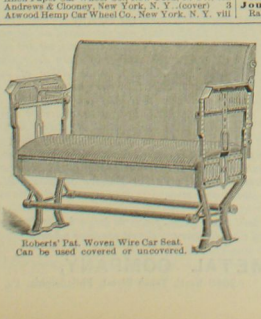

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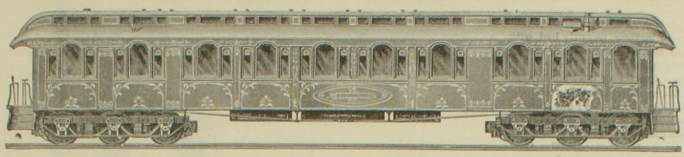

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VOLUME XVI. NUMBER 2. | FEBRUARY, 1885. | SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

Miscellaneous Items.

THE Youngstown (O.) Car Works have received several large orders and have increased their force.

THE Fishback Rolling Mill, at Pottsville, Pa., idle for several weeks, owing to a lack of orders, has resumed work full-handed and on full time, with prospects of steady work.

THE Pennsylvania Railroad Co. have arranged to apply the Richardson balance slide-valve to all their locomotives, as fast as possible. These valves are manufactured by F. W. Richardson, Troy, N. Y., who is sole agent for their sale.

THE Alabama Great Southern Railroad Co. have decided to increase their capital stock $1,000,000. A portion of this will be used in the erection of large machine shops at Birmingham, Ala., which have for some time been in contemplation.

THE Schenectady Locomotive Works have received an order for locomotives from the Chicago & Northwestern Railway Co., sufficiently large to keep the works busy for several months. An additional force of men has already been put to work.

THE Boston & Maine Co. has contracted for the equipment of all its freight cars with the "United States" coupler. The contract covers its leased and controlled lines also, including the Eastern, the Maine Central and the European & North American roads.

THE Jones Car Works, at Schenectady, N. Y., which went into the hands of a receiver about a year ago, have been leased to Walter A. Jones, the president of the former company, and work has been commenced with a force of 100 men. The lessee has received a large order from the Wagner Car Co., for drawing room cars.

THE *Manufacturers' Record*, of Jan. 24, published at Baltimore, Md., contains a long list of manufacturing establishments that have resumed work within the preceding four weeks. It estimates that 100,000 men have gone to work in enterprises of this class since Jan. 1; also, that in addition to this, a large number of miners, 10,000 in one Pennsylvania county alone, have commenced work within the same time.

ON the 1st of October last there were engaged in traffic on the Massachusetts railroads, according to the returns to the Car Clearing House, 28,562 freight cars, and on the 15th of the same month there were 28,358—a remarkable equality of numbers for dates so wide apart. Of the 28,558 cars in Massachusetts Oct. 15, 13,966 belonged to Massachusetts roads, and of the foreign cars 10,814 belonged to roads west of the Hudson River, the rest being those of New England roads.—*Railroad Gazette.*

THE Citico Furnace and the Chattanooga Furnace, at Chattanooga, Tenn., have resumed operations, the former having been out of blast four months, and the latter two weeks. A dispatch also says: "The forces of hands at the Alabama Great Southern car shops, and at the Chattanooga cotton factory, are being increased on account of inpouring orders, and all the iron men report an extraordinary increase of inquiries from all parts of the country. Three saw-mills started up to-day and two more will start next week."

AT the Harlan & Hollingsworth Co.'s shipyard, Wilmington, Del., the mail boat "Cape Charles," which is to run between Cape Charles and Norfolk on the New York, Philadelphia & Norfolk Railroad, has been launched. It is 262 feet long on the deck, 36 feet beam; breadth over guards, 64 feet; depth of hold, 14 feet. She is built extra strong, of iron, and is expected to make 18 miles an hour. She can carry two Pullman sleeping cars, an express car and a combination car on her deck, is fitted up with saloon cabin, etc., and is to be handsomely furnished and illuminated by electric lights.

THE car and locomotive shops of the Delaware, Lackawanna & Western road, at East Buffalo, N. Y., have been built and equipped within the past two years under the superintendence of Mr. Charles Graham, who has for twenty years been the Master Mechanic of the Bloomsburg Division, at Kingston, Pa. Mr. Graham entered the service of the company thirty years ago, as a machinist in the shops at Scranton, Pa. His duties on the Buffalo Division of the road have recently been transferred to Mr. F. B. Griffith, who has been promoted from General Foreman of Motive Power to the position of Master Mechanic at East Buffalo.

THERE has been recently patented a device for increasing the adhesion and consequently the power of a locomotive engine, by throwing a portion of the weight of the tender upon the driving wheels. Tests have been made and most gratifying results have been reported. Some of the daily papers, in commenting upon it, fall into the error of supposing the idea to be a new one. The device is probably new, but the idea is old. A patent for a method of doing this was issued to E. L. Miller, of the old Charleston & Hamburg railroad, as long ago as 1834. Mr. Baldwin, of Philadelphia, bought the patent in 1839, and has used the device, it is said, on many of his engines.

AN apparatus has just been invented in France for the prevention of railway accidents. It consists of a sheet of opaque glass on which the rails are indicated by horizontal lines and the stations by vertical ones, numbered. Little arrows, representing the trains, move along the horizontal lines. They are put in motion by aid of electricity developed by the contact of metallic brushes attached to the locomotives with zinc bands placed along the rails. The train thus continually traces its trajectory on the glass indicator. When one train approaches another too closely the person in charge of the apparatus can immediately signal the menaced train and inform it of its danger.

THE "over-production" theory seems to be gaining ground and is obtaining official recognition. The New York Railroad Commissioners say in their report that "Overproduction of almost every staple article of human consumption seems to obtain throughout the civilized world to a greater or less extent, and in no branch of business has this, together with excessive competition, been more severely felt than in transportation. For many years four trunk lines sufficed to carry the surplus of the crops from the West to tidewater. Now there are seven. The difficulties of settling the fierce rivalries between the four were great; between the seven they have proved thus far insurmountable."

THE productive capacity of the steel rail mills of the United States is about 1,600,000 tons per annum. About 600,000 went into new lines last year, and the amount used as renewals, new second track, and siding is estimated at 650,000 tons, or 5.42 per cent. of the total amount of rails in track. This rate is equivalent to a renewal of the lines once in 18.4 years. At the end of 1883, a little more than half the track of the United States was iron. The consumption of rails for maintenance ran down from 10.20 per cent. in 1872, when steel rails were first used, to 5.92 per cent. in 1877; then rose again to 11.16 per cent. in 1881, and receded again to 5.42 per cent. in 1883. The production of steel rails increased from 83,391 tons in 1872 to 1,304,393 tons in 1882.

IT is asserted on engineering authority that the best wood yet discovered for railway sleepers is zapote, used for this purpose in Mexico. It is essentially a tropical timber, and is exceedingly durable for outdoor or indoor work, above or below ground. Samples of this wood taken out of buildings said to have been erected more than two centuries ago, show not the slightest indications of decay. In color is nearly as dark as logwood, is very heavy and sinks in water, and so hard that the boring of holes for spikes and forming the grooves for the rails is very laborious work. It has a tendency to split if exposed to the heat of a tropical sun for a few months; for which reason the zapote sleepers have to be equally covered with ballast.

ON the 10th ult., at Detroit, Mich., occurred the last act in the Fontaine locomotive episode. This locomotive was the invention of Eugene Fontaine, of Detroit, and wonderful results were promised for it. The central idea was the introduction of two friction-wheels above the driving-wheels. By the contact of the upper wheel with the lower one a greater number of revolutions per minute could be obtained, and hence a greater speed would result. A company was formed with $1,000,000 nominal capital. Two engines were built at an expense of $25,000, but they proved a failure. Altogether the company paid out $47,000 and received $2,700 in return. This was received on the day above named from the Lake Erie & Western Railway, which bought the engines, and will rebuild them as ordinary locomotives.

IT is announced by *Herapath's Railway Journal* (London) that arrangements are being made for holding an American Exhibition in London, in 1886, the exhibits to include some of the best at the New Orleans and Antwerp exhibitions of the present year, together with others illustrative of the state of art, literature, engraving and printing in the "New World;" also models of electric and kindred inventions, agricultural products, labor-saving machinery, and whatever is calculated to display American ingenuity to the best advantage and illustrate the principal phases of American life, "from a broker's office in Wall street to a prairie camp fire." The enterprise, it is said, will take definite shape as soon as the official sanction of the United States Government is received.

CAPT. JAMES B. EADS was recently interviewed while on a brief visit to Pittsburgh, as to the status of the ship railway. He said: "The public is pretty familiar with our efforts two years ago to get Congress to guarantee the interest on $50,000,000, at 4 per cent., for a term of years. We were unsuccessful in that, but have almost practically obtained the same concession from the Mexican Government. General Diaz, during his previous term as President of Mexico, was enthusiastically in favor of the enterprise, and since his re-election additional valuable concessions have been assured us. We have ample capital subscribed. There are about 40 stockholders in Pittsburgh, besides others in St. Louis, Cincinnati, New York and other cities. We can get all the money we want in London, but prefer, if it can be done, to have the money raised in this country."

THE GUN FOUNDRY report published by the United States Government contains a paragraph descriptive of a somewhat remarkable specimen of railroad work. The description relates to the wagon trucks for carrying one of Krupp's breech-loading rifled guns. The forward truck has eight wheels, and the trailing truck, which carries the breech of the gun, has twelve wheels. There is, strictly speaking, no body to the car other than that formed by the frame in which the gun is held. The frames of the trucks are riveted up in the form of box girders. The jaws holding the wheels are continuous, and are cut out of a thick plate of iron. Twelve wheels in one rigid frame, even if the frame is called a truck, would be considered in this country an extraordinary device for carrying a heavy load. The length of wheel base is not stated, but cannot be much less than 16 or 17 feet; but judging from the apparent size of the wheels, the rigid wheel base appears to be about 26 feet.

THE Anniston (Ala.) Car Company have just completed the Lucas Patent Express fruit car "Banana" which is to be forwarded to the New Orleans Exposition. It is of native wood oiled and varnished without paint. The ventilation is so arranged that a constant circulation of air will be maintained, removing all impurities arising from the nature of its cargo, whether standing or running. The body of the car is made in double sills, leaving spaces of two inches, up and down in which the air circulates, being impelled into them by wind sails and deflectors of iron on the top of the car, all of which are stationary. The interior will be supplied with convertable bunks which form shelves. A great advantage is that there is no possibility of the contents being disturbed en route by thieves prying openings on the sides. This is owing to the double sills, and air chambers formed thereby entirely around the car. The wheels and axles were furnished by Noble Bros. & Co. The springs are Chas. Scott's graduated make. Hewitt's oil boxes are used. The car is equipped with the American continuous draw-bar. The trucks are perfect, because the nut of each bolt is firmly locked by washers. The bolts turn instead of the nuts, and hence it is impossible for the nuts to waar off. This car is the most complete and perfect express car ever invented, and has only to be known to become generally used. The whole was invented, patented and arranged by Maj. C. E. Lucas, the well known superintendent of the company, formerly connected with the Lucas Car company, and generally recognized in railroad circles as the leading car builder of the South.—*Birmingham (Ala.) Age.*

Metal Cross-Ties.

The subject of iron and steel cross-ties for railroad purposes was the subject of an interview recently had with Chief Engineer Slataper, of the Pennsylvania Co., by a Pittsburg hreporter. Mr. Slataper said:

"About twenty years ago a director of the Fort Wayne road, on his return from a European trip, brought a model of the system employed with iron cross-ties; but further than a mere casual inspection of the model; nothing was done. Wood was too cheap and plenty in this country to talk about introducing iron or steel sleepers. The time will come, at the present rate of destruction of our forests, when something will have to take the place of wood in the building of railroads. In Europe they haven't got the wood, and can't get it. They even build their car frames of iron, using as little wood as possible in their construction. But to introduce them here would require a complete change of the present system, and not only the expense of the ties is considered, but the changes that would have to be made before we could use the iron sleepers.

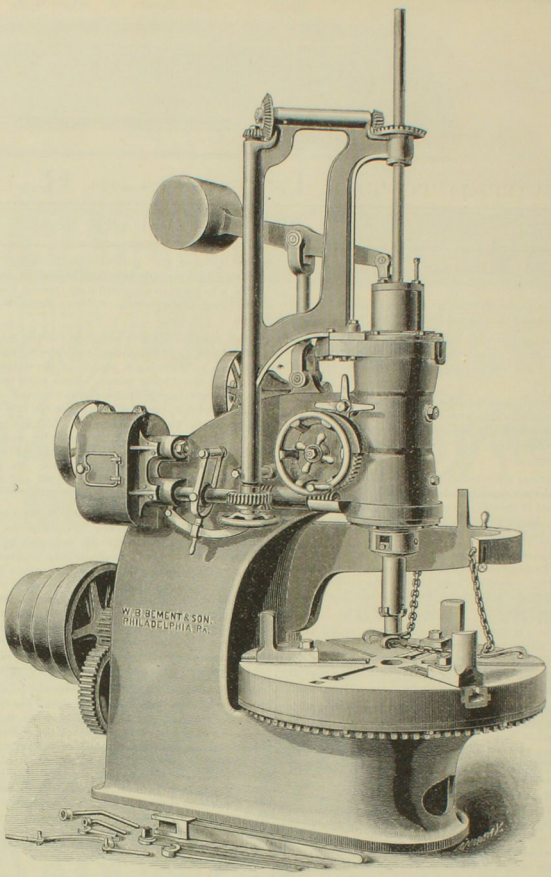
"Some objections have been made that the road-bed constructed with iron sleepers is too solid; that you must have some elasticity or spring. Nothing of the kind is required where everything is perfect. The more solid you can make the road-bed and the smoother you have the track, the easier your cars will ride, and there will be less wear. It is reasonable. You put a sleigh upon ice, and it glides along smoothly without a jar. So it would be if you had a perfectly smooth, solid road-bed, and all the motion that would then be noticeable in a car is that oscillating or swaying motion caused by the play that must be had between the rail and the flange. That you never can get rid of, but, under the circumstances mentioned, it would not be noticeable.

"I know of no roads in this country that are experimenting with iron or steel sleepers except the Philadelphia & Reading. They have a German engineer on that road who has been testing both the longitudinal and cross-iron sleeper, but with what success I do not know. It is only a question of time, and not long either, until nearly all the roads in the country will have to adopt something to take the place of the wooden tie. A wooden tie, under ordinary circumstances, lasts about eight years, while the life of a steel tie is indeterminable. They have not been in use long enough to know how long they will last."

The Car Coupler Question.

Referring again to the inevitable car coupler question, candor compels the admission that the prospects for the adoption of any particular style or patent for general use throughout the country are not at all ehcouraging. The master car-builders have wrestled with the question at every annual convention of their association for several years past, and at their last meeting proposed a plan, referred to in these columns recently, involving the collecting of a fund from the railways with which to thoroughly test the various couplers which are before the public, under the direction of Mr. M. N. Forney as the representative of the association. We learn that no action has yet been taken, however, looking to the carrying out of this plan and that there is little prospect that it can be made successful. There are so many conflicting interests to be considered and to be appeased or antagonized; so many patents, each of which, in the opinion of the inventor, is worth more than all the rest; so much money has been spent, so much stock has been disposed of, and there are so many ideas in direct opposition to each other that in the nature of things the adoption of a universal coupler for freight cars is simply an impossibility. Even if the railway commissions of half the States in the Union were to recommend a particular coupler, such action would not result in a suspension of efforts to introduce scores of others. Men who have invested their capital in the manufacture of an article in the value of which they have perfect faith, will not close their doors, discharge their employés, and permit their plants to fall into decay because a number of railways or a number of railway commissions may have declared in favor of a competitor. While it may be that there has not yet been discovered a perfect coupler, there are, nevertheless, a number which possess sufficient merit to render a choice from among them a most difficult task. There seems to be no other way but to allow inventive genius and capital the same freedom to invent and manufacture and sell that is allowed the universal American citizen. It may be questioned, however, whether it is politic or just, either to the railways or the inventors and manufacturers of couplers, to encourage the annual contest before the Master Car-Builders' Association, which has involved outlay by these people, many of whom are not able to incur unnecessary expense. —*Railway Age.*

R. T. WHITE, manufacturer of wood-working machinery, 40 Oliver street, Boston, has taken a store at 12 Cortlandt street, New York, where he will keep a full line of mortising, molding, and other wood-working machines for the convenience of customers in New York and its vicinity.



FORTY-EIGHT INCH CAR WHEEL BORING MACHINE.

The engraving represents a 48-inch car wheel boring machine, made by William B. Bement & Son, Philadelphia.

The frame has the general outline used for many years by this firm for machines of this class, and is unusually strong.

The bearing of the revolving table is made in the form of the Schiele curve; two such parts of one continuous curve being combined as will give the required vertical and lateral support, and at the same time maintain their uniformity of bearing.

The three chuck jaws are concentrically tightened upon the wheel by a single movement of a lever, and are quickly adjustable to wheels of any diameter not exceeding 43 inches on the tread.

The boring spindle is of large diameter, hollow, counterbalanced, and provided with quick and easy hand movement. Its wear is compensated for, and its accurate alignment preserved, by the use of the well-known split conical bushings, which in this case have large surfaces and can be rigidly clamped in any position to which they are adjusted.

The vertical boring feed is thrown into gear by a conical friction, and has six changes, which are operated by a sliding clutch-pin; a device so long in use as not to need explanation. L. R. Faught's patent quadruple cutter is much used as a boring tool in these machines, and is frequently fed through a finishing cut at the rate of half an inch per revolution.

The hub-facing device shown in the cut is also one patented by Mr. Faught. A slide which carries the facing tool receives a surfacing feed from a vertical shaft, which passes centrally through the boring spindle and may be actuated either by hand or by power. A gauge screw is provided, by means of which the facing cutter can be brought into the same position for any number of wheels successively.

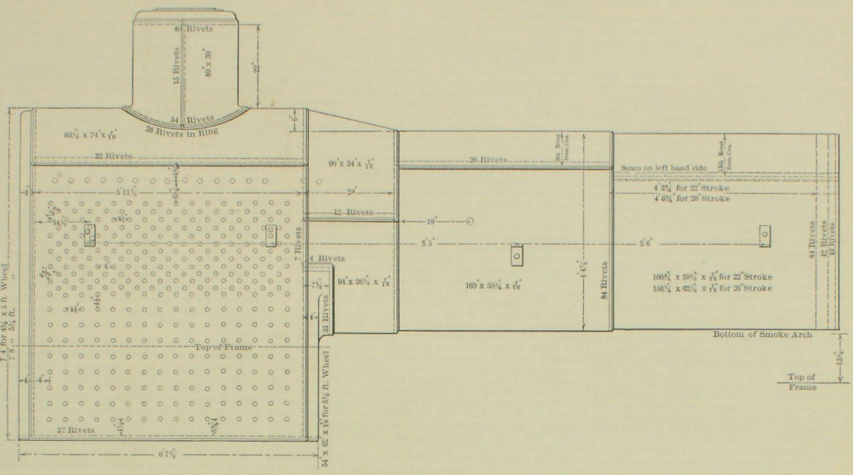
The wheels are raised and lowered by a vertical screw, which is caused to revolve rapidly in either direction by the movement of a lever, and upon which the crane arm is threaded and can be swung to any required position. The wheel is caught by hooks fitting the flange and raised to the proper height. It is then swung inward until the crane arm strikes a stop, when the wheel is centrally over the table, and can be lowered vertically into the chuck, no pushing or sliding being required.

These machines, when managed with a very moderate amount of skill, are capable of producing accurate and uniform work with great rapidity.

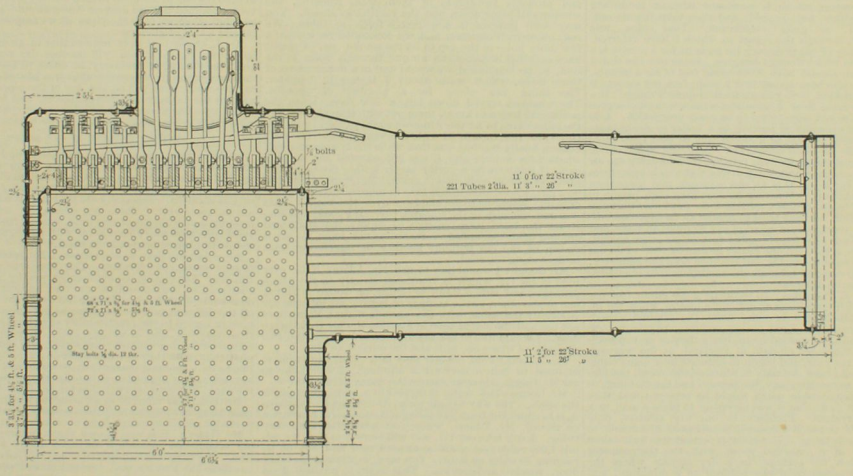
Locomotive Boiler—Boston & Albany Railroad.

The cuts on opposite page represent a boiler designed by Mr. A. B. Underhill, Superintendent of Motive Power of the Boston & Albany Railroad, to carry a working pressure of 160 pounds per square inch. Fig. 1 is a longitudinal section, and Fig. 2 a side elevation. The boilers for the different sizes of engines are indicated in the drawings by duplicate sets of figures. Three sizes of drivers are used on engines fitted with boilers of this kind. One has 4 feet 6 inch, the second 5 feet, and the last 5 feet 6 inch drivers. Some of the engines have 22-inch stroke, and the others have 26-inch. This long stroke has been in use on this road for many years. For the long stroke engines the tubes are 11 feet 3 inches long, while for the 22-inch engines they are 11 feet. For engines with 4½ and 5 foot wheels, the fire box drops 28½ inches below the waist, but it is 32¼ inches in engines with the 5 foot wheels. The fire box is 4 inches higher for the engines with the large wheels than for the small ones. The dome opening is strengthened by a heavy ring secured to the shell by a single row of rivets. The dome is flanged out and fastened by one row of rivets

LOCOMOTIVE BOILER (52-inch) — BOSTON & ALBANY RAILROAD.



Side Elevation.



Longitudinal Section.

which goes through both shell and the ring. A portion of the sheet is turned up into the dome opening and is riveted to the dome. The plan of flanging all round has been tried on the road, but has not been found satisfactory. Seven stays cross the boiler from side to side between the crown bars. The stay-bolts are ¾ in. in diameter, and have 12 threads to the inch. The five top rows of stay bolts have a ⅛-inch hole drilled ⅜ of an inch into their outer ends. The material of the boiler is Nashua steel. This is used both for the outside sheets and for the fire box. The longitudinal seams are double riveted and the circumferential ones single. There are 221 two-inch tubes. All the stay bolt holes and all the rivet holes in the fire box are drilled. The heating surface of the tubes, inside, is 1,140 square feet, the heating surface of the fire box 130, making a total of 1270 feet. The ratio of the grate area to the heating surface is as 1 to 3.6. The sectional area of the stack to that of the grate is as 1 to 18.

The following table gives the principal dimensions of the boiler with other details:

Working pressure per sq. in.	160 lbs.
Material	Nashua steel.
Ultimate strength	62,760 "
Elastic limit	45,422 "
Extension in 8 inches	29 p.c.
Contraction of area at fraction	53 "
Style	Wagon top.
Diameter of shell, smallest course, outside	52 in.
Thickness "	7/16 in.
" " front flue sheet	½ "
" " back "	5/8 "
" " crown "	7/16 "
" " back end of fire box	5/16 "
" " sides "	5/16 "
Fire box	Nashua steel.
Furnace door, elliptical	13 × 18 "
Depth of fire box front	70⅝ "
" " back	70⅝ "
Length " inside	71½ "
Width " "	35¼ "
Area of grate	18 sq. ft.
Distance between crown sheet and wagon top	20 "
Width of fire box at " front, inside	46¼ "
Width " " at " back, "	44⅝ "
" " water space, front end	3½ "
" " " sides, at bottom, 3; top front, 3½; back 4½ in.	
" " " back end	3 "
Diameter of dome, outside	28 in.
Height "	22 "
Thickness of dome sheet	7/16 "
Diameter of braces	1¼ "
Distance of braces apart	6 "
Number of tubes	221
Outside diameter of tubes	2 "
Length of tubes	11 ft. or 11 ft. 3 "
Thickness of tubes	5/32 "
Water space between tubes	5/8 "
Heating surface of tubes	1,140 sq. ft.
" " fire box	130 "
Total heating surface	1,270 "
Length of smoke arch	37¼ in.
Diameter of rivets	¾ "
" " stay-bolts	7/8 "

The material of which these boilers are made is worth attention, both for its high tensile strength and its high elastic limit, the latter exceeding 45,000 pounds per square inch. The metal is very ductile, the specification calling for an extension of 30 per cent. in an 8-inch specimen, and a contraction at the point of fracture of more than 50 per cent. Such a material compares favorably with some of the best specimens of steel boiler plate mentioned by Thurston in his "Materials of Engineering" as having been tested by Kirkaldy and others.

LOOKING over the report of the Master Mechanics' committee on boilers, we find that a very natural mistake has been made in regard to the Pusey & Jones boiler, which was described and illustrated in the CAR-BUILDER for April, 1884. It is taken for granted that being largely used on steamers, the pressure would be small. This is not the case. The pressure used on the boiler which is illustrated in the Master Mechanics' report was 150 pounds per square inch, and higher pressures than this have been used. This, in connection with the fact that they have run in salt and brackish water, puts a very different face upon the design. The design is interesting, as showing how, with bad water, high pressures and the necessity for lightness, the problem of an economical and powerful boiler has been solved.

Master Car-Builders' Club.

HEATING, LIGHTING AND VENTILATING RAILWAY CARS.

The regular monthly meeting was held at the rooms of the club, 113 Liberty street, New York, on Thursday evening, Jan. 15. The President, Mr. A. Gurney, announced the subjects for discussion to be the Heating, Lighting and Ventilation of Railway Cars.

Mr. W. G. Creamer said: If railway men would thoroughly comprehend the power they have with them all the time when the cars are in motion, they could easily provide a device to get pure air in their cars. The end I have always had in view has been to utilize that power. I don't think it is possible to ventilate a car by natural ventilation because the cubical contents of the car is so small in comparison with the number of persons that are inhaling the air. You must have some power to force or suck the air in. The plan that has been very extensively used, of having sashes that tip over, is about the worst that a man with ordinary common sense could imagine. There is no provision for getting the air in, and this is necessary before you can get it out. You cannot get a system that will exhaust air from a vacuum. I am now improving a system of ventilation combined with heating, but I have not yet got it ready to offer to the public. One of the improvements I have made in my automatic ventilator has been to adjust the pivots that hold the blind so that the top pivot is out about $\frac{1}{2}$ of an inch beyond the bottom one, its own gravity keeping the blind standing out. When the car gets in motion, the air strikes the flat surface and causes the blind to occupy its proper position.

Mr. H. A. Gouge: I have heard it said in discussion here that the heating and ventilating of railroad cars had played out, but I don't know whether I believe it or not. I think there is a great deal to be learned, and that if any one would tackle the subject they could employ their leisure hours very nicely and find a good deal of money. The master car-builders, in 1873, I think, appointed a committee to investigate the subject and find out what was wanted. The committee say, or rather argue, that ventilation is absolutely necessary, and that at least 1,000 cubic feet of air per minute should go into and out of a car carrying 70 passengers in order to constitute good ventilation. They also state that it is absolutely necessary that the heating and ventilating should be combined. Now, it strikes me that the whole thing lies right there. If a man can handle 1,000 cubic feet of air a minute, given the temperature which is necessary without producing currents either hot or cold, and then take the air out, it would be good ventilation. That idea was carried all through the report to which I have referred. The quantity of air necessary for a car or for a person is a question on which doctors disagree. Some one has stated that a man should have 2,000 cubic feet of air a minute, and it has also been stated that 2 cubic feet per minute is good ventilation. So you see there is quite a range. If a man consumes 3 or 4 cubic feet a minute, and you give him 10, it would seem to me to be good ventilation. I do not see the necessity of putting in a boiler or steam-heating apparatus as large as a locomotive to heat 1,000 cubic feet of air for each passenger. Take the Spear stove. That is constructed on the principle of admitting the air around the heater, and transmitting it through apertures along the car side. It is an old principle, and there is no question about it. Whether he does give each person 10 cubic feet of air or less a minute I do not know that any body can tell. I have tried to handle air in given quantities at an average temperature of 70 degrees, and to take in not less than 10 cubic feet of air every second, and handle it through one heater instead of two. I do not say that I have succeeded, but that has been the endeavor. When you come to take all the conditions into consideration it is quite difficult.

Mr. W. E. Partridge: To reconcile 2,000 cubic feet per minute with 1,000 is not so difficult a matter when we investigate the conditions under which the original experiments were made. Some doctors and some physicists took such a case as a crowded hall, or perhaps a sick room, in the moist climate of England, at the warmest season of the year, and began to estimate how many cubic feet it would take, not only to ventilate the room, but also to wash, as we may say, the persons and the clothing, so that no disagreeable effluvia should be perceptible. They found that to do that it was necessary to place a man in a small hurricane. Probably in our dry climate, only about half as much air would be necessary in summer to do the same thing. The other experimenters have taken the case of a crowded room with the thermometer down below 60° perhaps, in a dry climate where the insensible perspiration was reduced to a minimum, and then have attempted to give each person an amount of air sufficient to keep the room in fairly good condition, while the smell would not be offensive. Under those conditions the quantity of air is very small, and the air will be tolerably breathable. You will observe that between these two extremes we have in one case a washing when the skin is most active, and in another case, namely, provision for respiration when the skin is doing very little, and heavy clothing is preventing a large proportion of the insensible perspiration from contaminating the air. Now, it is probable that in our railway cars in winter, the latter conditions prevail. In other words, we may look toward a minimum supply, or the quantity of air inhaled by breathing, rather than large quantities required by air-bath conditions.

Mr. Grimshaw suggested that in addition to heat and air, a certain amount of moisture was necessary. Air could be perfectly pure and kept so dry as to make people feel uncomfortable.

Mr. Wm. Bedell, who said he was not a scientist nor a railway man, exhibited some drawings of a plan for ventilating cars, the nature of which he stated to be as follows: The ventilator is placed upon the top of the roof. It has a truck or cylindrical passage way. It is on the principle of exhaustion, has flaring or trumpet ends and has dampers at each end. It also has diaphragms of wire-cloth over each end. It has inlets at either door that have flap dampers, also wire screens. It receives the air at the front platform as the car advances, from the under side of the plate, passes upward, opens the valve, passes through the wire screen and passes down to the floor inside and disperses itself in the foul or warm air. It provides for exhausting the air, and at the same time provides against ingress of dust or cinders, and ventilates the car when stationary as well as when in motion.

Mr. Ellis: I have had the idea forcibly impressed upon me that moisture in the air was important. I would like to ask if any one is familiar with the Mann system of ventilation, and whether that supplies the moisture?

Mr. F. D. Adams (Boston & Albany): This is an old and hackneyed subject. I have got utterly tired of it. I almost think it is a humbug. Mr. Ellis wants to know something about the Mann system. We have had a little experience with it. Mann's system of ventilation for his cars is particularly fine, but when you get out of them they don't look so well. We had a test of the system on a smoking car for some time. The system consists of passing air down through a tube. It is taken in through a bell-mouthed arrangement covered with wire gauze. The air goes down into an ice chamber and passes over the ice, through it and among it, through some excelsior, which being packed under the ice is kept constantly wet and takes out of the air all the dust and cinders that may be gathered. When the air leaves the excelsior it is comparatively clean and free from dust; then it passes along through the car and is distributed by registers. The effect is a very comfortable atmosphere. I have ridden in the cars a number of times and am pleased with the ventilation. Whether it is moisture in the air I cannot say; I never thought of the matter in that light before. I think it is a good thing. The air is warmed in the winter by passing over pipes so that it reaches the passengers at a temperature that makes the car very comfortable and renders breathing easy. I spoke about this being particularly adapted to his cars; not to create a wrong impression, I would like to explain the application we made of it to a smoking car. His cars are intended to carry about 24 or 28 passengers. That fills them up. We calculate to carry 70 in our cars, which is quite a difference. Now, according to the theory of these parties who talked about the quantity of air a person needs to breathe, it is generally admitted, or at least claimed, that it requires about 10 cubic feet of air a minute for every man to breathe in order to have a healthy condition of things. You can readily see that air that would be sufficient for 28 persons would not answer for 75. We put Mann's system on this car with the idea that it would make it clean and comfortable. We were disappointed. The arrangement with Mann was that we should carry out his suggestions, and that the windows should be fastened down, leaving no openings except the holes provided by the system. We fitted the thing up to his satisfaction, and he inspected it and said it was all right. He rode with me on the car to Worcester to give it a trial. There was from a dozen to the car, and probably two-thirds of them were smoking, the windows all being down and the ventilators closed. You may well imagine it was pretty thick in there. We rode on up to Worcester, and we concluded we wanted a few more holes in the top to let the smoke out. I might have said that he takes the air out through holes in the roof, so he concluded we would put in a dozen more of those holes, which were about 6 inches in diameter. The thing ran along for a number of months. The windows stayed down a few days, when the passengers began to knock them out with their elbows, and the order came to fix the windows so they could be raised. Of course, that interfered with the ventilation. The conclusion finally reached was that while the system was well adapted for locomotives, it was not adapted for sleeping cars. I think we have pretty much settled down to that idea and will let well enough alone. Mr. Mann might put on a larger hood that would take in more air, but then the difficulty would be to get the cars over the road. That was one difficulty we had to contend with. We could not construct the hood large enough to supply the additional amount of air demanded, as there was not room to put it on top of the car without liability of interfering with bridges along the road.

Mr. Gouge: I would like to ask Mr. Adams if he ever rode in car 171, which is ventilated strictly on the Mann principle, and either Mann is Gouge, or Gouge is Mann, one or the other, as the manner of getting air into the car is exactly the same, with the exception that Mann does not use half the size of tube in ejecting the air that Gouge does. I would like to ask the difference between the two systems, or where one fails and the other does not.

Mr. Adams: I do not say they fail. I say I am almost inclined to believe they are a humbug. I would like to ask Mr. Gouge where he carries the water in his cars?

Mr. Gouge: I carry it in a barrel in the car underneath the stove. The way to heat a car, or the way to ventilate it, is to admit the fresh and take out the foul air. I have you on record, Mr. Adams, where you advocated that very thing. I will take car 171, and will show you that we admit 1,000 cubic feet of air a minute when the car is only running 30 miles an hour. You may weather-strip every door, window and crevice. That ought to produce good ventilation. The Mann system certainly cannot do that, because the tube is not big enough; the trap is not big enough to catch it. I am inclined to think Mr. Adams should say that that ventilation is a humbug.

Mr. Adams: I believe I did not say that it was a humbug, but that I was almost inclined to believe it was a humbug. I never heard, however, that Mr. Gouge used ice-water in connection with his ventilation. I think that is rather an improvement to it. We are pretty well satisfied that our plan is about as good as they make them. I do not know but they will try half a dozen more, but I hardly think so. We have tried Gouge's system pretty thoroughly. We do not find it will do all that is claimed, and we have also tried Col. Mann's. We have lots of Creamer's and any quantity of others. Probably no road has tried more inventions of the kind than we have. There may be something better, but we have thus far failed to find it.

Mr. Creamer: The very system that Mr. Adams says he adopts is nothing more nor less than carrying out the system we have been recognizing as correct for years and years. As far back as 1852 they had, on the Emerson & Hudson River road and the Canada & Atlantic road, these little wickets to let air in at the side, and provided with hoods at the top to let the air out. The system Mr. Adams advocates is the correct one. My system is a device that accomplishes the results desired in the ventilation of cars. I am just as much opposed to these abstruse methods as a man can be. A few days ago I was going over the Pennsylvania road, which has the system of deflected sashes. The moment the train stopped there was a whirlwind of cold air, and I noticed that the passengers got up and closed the ventilators, but as soon as the cars got in motion again it was all right. If the car stands still, the device to let the air out will change its position. The ventilation is perfect and that is all that I have ever claimed for it. I have never offered the railroad companies any complicated contrivances. I have aimed to accomplish ventilation by the simplest and most common-sense principles and those that are applicable the year round. I am now getting up a heater in which I am simply carrying out ideas that I have long considered. I propose to take the air in around my heater, but not to take it in at the top of the car. I believe that is wrong in principle. I propose to take it in low down, and use one of the side windows for the purpose. [Mr. Creamer illustrated his system by drawings.] He concluded by stating that he proposed to place his heating apparatus in each end of the car, and to take in about 700 or 800 cubic feet of air a minute.

Mr. Grimshaw: I would ask if warm air will not hold more moisture than cold air? also, if there is any advantage in placing the heating apparatus in the centre of the car, instead of at either end?

Mr. Gouge: In reference to the moisture, I do not know that I can explain it scientifically. In most of the heating apparatus, such as furnaces, where air is passed over them for the purpose of receiving warmth, we know that nine out of every ten, until within a very short time, have been made of cast iron, and the fire burns right on the body, and the air is passed over the red-hot surface and burns out the particles of air, which we consider injurious. When you come to figure the percentage of moisture in a body of air, you will find that it is very small. There is always water in the air, and if you heat it over a furnace which would not raise the temperature more than 100 or 120 degrees, you certainly do not injure it; that is, if you do it over a wrought-iron surface where there is no gas allowed to enter the air chamber. You cannot destroy moisture. Air will come in any way, no matter how you heat it.

Mr. Grimshaw: You cannot destroy moisture, but it is a fact that hot air does require more moisture than cold, and if it can not get it in at one place, it will in another.

Mr. Adams: I will state another experiment we tried with ventilation. Sometimes these fellows blunder on good things. We had two pipes running along the side of the monitor, with two devices to catch the wind, and it caught most everything else that came along. It was used to take the air down into a box filled with water, through which it passed, and up through another pipe and into the car. It worked very well for a few days, when we thought to fill the box with water. But one day the boys omitted this duty, and it made the car perfectly awful. The thing ran along some two or three months, when we had occasion to take the car to the shop to take out the pipes. The inventor claimed that no dust or cinders would go into the box, but when we took the pipes off we emptied out a barrel and a half of cinders.

Mr. L. Garey: I have noticed that in an office heated by hot air the inkstands will become dry very rapidly, and I have found it necessary, in order to keep sufficient moisture in the air where the office was heated from pipes, to have water pans put on the top of the pipes in order to prevent the desks from going to pieces. I found that it would take the moisture from wherever it could get it. I would like to hear some remarks on the question of

SAFETY HATCHES IN CAR ROOFS.

I believe these are an actual necessity, and there will come a time when it will be necessary to put them in the roofs of baggage, express, sleeping, postal, mail cars, where there is no possible chance for the passengers to escape in case of accident. Especially are they useful when the cars are on their side. There are difficulties attending the introduction of things of this kind, and as there are some gentlemen here who do not agree with me on this subject, I should be pleased to hear from them.

Mr. Adams: That is a question I am interested in at present quite considerably. The President of the Car Builders' Association complimented me by making me chairman of the committee on that subject. We have done some work in regard to it; have sent out circulars to all the different railroads, hoping to get opinions and replies in regard to the practicability of it. I have received from very few, and invariably every one who has made a return—I think about ten—has stated, and some very emphatically, that they did not want any holes in the top of their cars. One man suggested, if there was going to be any holes, they ought not to be other than those already in the cars; but every answer thus far has been No.

Mr. Partridge referred to an accident which came very near being an illustration of the necessity of safety hatches to enable people to escape from overturned cars.

Mr. Garey: It is well known that any innovation upon old established customs is objected to by everybody at first. We have lived all this time and run our cars without these hatches, but that does not make it perfectly clear to my mind that there is no necessity for them. Think for a moment of men placed in a mail car, for instance, which is thrown upon its side, without any chance or possible means of getting out unless a hole is cut with an axe. In that condition, what would they not give for a chance to get out, rather than be burned or smashed by the car? If a safety hatch were placed in the roof, say taking the entire width of the clear-story of the roof—for a 60-foot car, have two of them—arranged so that they would leave the car automatically when at an angle of 45 degrees or more; that is, that the roof would drop off and allow the passengers to escape alive when the car was thrown to a standstill. On passenger cars with large windows there is not so much necessity for it, but for postal or mail cars, I think we shall soon come to put safety hatches on. This idea was suggested more forcibly by the accident that occurred on the New York Central road, when there were some very prominent people imprisoned in a car for a long time without being able to be reached by the people at hand, with all the facilities for getting them out. Had there been a fire, there was a sufficient time to have burned them to death. The only real difficulty that I can see in putting on these safety hatches is making them weather-proof; preventing cinders, etc., from getting in. The ceilings of cars as now constructed are such that it would not detract anything from their general appearance that I can see. The ceilings are cut up in small sections by moldings, etc., so that in using either wood or canvas linings, the symmetry of the car ought not to be defaced in any way. I now refer to sleepers. All this would be unnecessary for postal, baggage and express cars. I am sorry to learn that I am alone in favor of this. I hear from Mr. Adams that every one seems to be against it; but, gentlemen, I believe I am right and the time will come when you will agree with me on this subject.

Mr. Adams: How would it do to put skylights in postal cars? Would not that answer the purpose?

Mr. Garey: I would say that we have on the Central road what you might term a safety hatch or skylight, made of glass.

Mr. Adams: If there is to be any opening, I should propose skylights.

Mr. J. T. Leighton: Some time last summer, I think it was, I was at Mr. Adams' shop, and he took me to a mail car and called my attention to the glass in the roof. If I am not mistaken, I think that when he was talking about these safety hatches, that was one of the points that he claimed for it. I think it is a desirable thing to have; but as to the automatic safety arrangement, I declare I don't know how you are going to keep it water-tight. It is a desirable thing to have, and have it so it will tumble off when it gets at just the right angle. I can see that glass might be a pretty good thing to have.

Adjourned.

Car-Shop Blanks.

At the Car Works of the Wason Manufacturing Co., at Brightwood, Mass., a very convenient and somewhat elaborate system of blanks for various purposes in connection with the works has been developed. One feature is especially worth imitating in any large manufacturing establishment where there is much routine work. This is a printing office on a small scale, which one of the gentlemen connected with the drawing office manages. By means of a few fonts of type, such as are provided for amateur use, and a small hand-press, he is able at a very small expenditure of time and money, to provide just such blanks as may be found needful. A still further advantage of this system is, that blanks may be altered from time to time, and improvements made as practice suggests, without the expense and delay consequent upon the employment of an outside printer. The cost of this system is merely nominal, as the work can usually be done in odd moments or in time which may be conveniently spared. When a blank has reached a satisfactory form an electrotype can be obtained. This frees the type, which can be used for other purposes while the stock of blanks is easily kept up by the boy who does the press work.

The following are some of the forms which have been found especially useful in saving time and labor in the office. The first of these is headed "Wason Manufacturing Company." It is used to give permission to the men for a variety of things. It covers working over-time, being absent from work, carrying tools from the works and being on the premises on Sunday. For all of these things it is necessary to make out permits, and by using the blank it is easily and quickly done. When filled out, the name and date are written, and the word indicating the service or permission checked, and also the A. M. or P. M., as the case may be. By the use of this blank, a date, name and two or more check marks are all that are necessary to make out a complete permit, which gives all the necessary information to all concerned, which is not liable to be questioned, and which has the very desirable advantage of uniformity.

WASON MANUFACTURING COMPANY.

PERMIT TO

Mr. _____ *for*

OVERWORK. TOOLS. ABSENCE. SUNDAY.

Date, _____ 188

A. M. P. M. H. PEARSON, Supt.

The second blank, headed with the words, "Keep this Card Clean," is printed on a card which is given to each workman in the establishment. These cards differ from each other only in having different letters in the corners to indicate the departments to which the men belong. Their use and their advantages will be seen at a glance. In addition to this card, another is used when job work is being done. This card is headed with the usual request to keep clean and the line "Job work of." Time, quantity of material, etc., are entered as the case may require. These, in connection with the requisitions for material, form a check on each other. The same is true of many of the other blanks which are used. The balancing of accounts which may, in this way, be obtained, is a very valuable feature.

Keep this Card Clean. B

Time, in Hours, of

For Month of _____ 188

WASON MANUFACTURING CO.

☞ This must be returned to the Timekeeper at the end of each week, with correct entries. No credit will be given for time not mentioned hereon.

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	No. Hours.		Amount.	
					$	

Keep this Card Clean. M

Job Work of

For Month of _____ 188

WASON MANUFACTURING CO.

Perhaps the most important of all the forms used by the company are those upon which the original entries for an order are made. These we show filled up with the details of the new dining cars, recently completed by the company for the Boston & Albany and the New York, New Haven & Hartford railroads. One set of these is kept in the drawing-room for reference, upon a series of clips which are provided for the purpose. Each clip is fastened to a small board, and all are placed together on a suitable frame. They are numbered and lettered so as to show the department to which the blanks it contains belong. So long as an order is in progress or not yet completed, a full set of blanks is thus accessible in the drawing-room or superintendent's office. These contain a full specification of the work as it is being done. Each department has such a blank filled out for it as will enable it to proceed with its share of the work. At the top of each blank are indicated the departments to which copies are sent. It will be noticed that in many cases references are made to drawings, to patterns, and to standard styles of work, for which the establishment has regular templets or standard specifications. This, perhaps, needs a word of explanation. Usually in car shops, when a new style is got out, it gets the name of the road which first gave the order for it. In after specifications it is always referred to by the name of that road and has to be hunted up like any other outside matter. The plan adopted here, however, is to make each pattern a part of the shop system, and give it a number by which it is kept, found, recognized and referred to. In one of the blanks "Pole, No. 135" will be found. This refers to the graduated sticks or poles kept in the framing room. These poles contain the graduations for laying out the framing. It is only necessary to indicate the number of the pole to enable one who is laying out the work to proceed intelligently and with certainty. Reference to a drawing makes a blue print from that drawing a part of the specification, and gives more clearly than any description could, the instruction necessary for that part of the work. In the same way drawings of ornamental designs for finishing, trussing, bracing, castings and a variety of other details, are all indicated by reference to other parts of the system. This makes the entry of a given order comparatively simple, while at the same time it is detailed to the workmen, or to the foreman of the departments, with the utmost accuracy and without a chance for errors or misunderstandings.

[1 *For Body Room*, 1 *for Blacksmith Shop*, 1 *for Machine Shop*.]

BOSTON AND NEW YORK DINING CARS, JUNE, 1884.

BODY FRAMED OVER SIDE AND END SILLS, 64′ 0″ × 9′ 6″
HEIGHT FROM SILL TO PLATE, 6′ 7″
HEIGHT FROM FLOOR TO DECK ROOF IN CENTRE, 8′ 0 5-16″
TIMBERS.
SIDE SILLS, 5¼″ × 8½″ END SILLS, 8½″ × 8½″
STRINGER, 4½″ × 7″ TRUSS PLANK, 1¾″ × 12″
SIDE PLATES, 3″ × 5¼″ END PLATE, 2¾″ × 2834″
CROSS JOIST, 1¾″ × 7″ TIE PLANK, 4⅜″ × 10″
BUFFER BEAM, 7″ × 8″
BOLSTER, *Double-iron.*
BRACING NO. 1 TRUSSING NO. 3 POLE NO. 135
ROOF DRAWING NO. 80 FRAME NO. 80 H. POST PATTERN NO. 41
IRONS 4 1″ THROUGH SUSPENSION RODS 1⅜″ ENDS
12 ⅝ CROSS RODS
9 CARLINS 1⅜ × ⅝

[*For the Cabinet Shop.*]

C.—DOORS, END, 2′0″, *Mahogany. Drop* SASH. GLASS, 16″ × 10″.
HEADLINING, *Mahogany Veneer plain.*
SEATS, *see Drawing* 80 H. BACK STRIP, *Mahogany.*
CUSHION, *Drawing* 86.
COVERING, *Leather.*
22 LAMPS *Adams & Westlake* 6, No. 306 10, No. 104
2, No. 206 4, No. 300
TRIMMINGS, *Bronze.*
HEATER, *Baker & Smith.*

[*For the Cabinet Shop.*]

CABINET—BODY FRAMED OVER SIDE AND END SILLS, 64′ 0″ × 9′ 0″
HEIGHT FROM SILL TO PLATE, 6′ 7″
HEIGHT FROM FLOOR TO DECK ROOF IN CENTRE, 8′ 0 5-16″
SIDE SILLS, 5½″ × 8½″ TRUSS PLANK, *Outside.*
DECK SILLS. DECK PLATES.
POLE No. 135. ROOF DRAWING No. 80. POST PATTERN No. 41.
EXTERIOR WINDOW FINISH, *Square.* CANOPIES, 7.
INTERIOR FINISH No. 14, *Mahogany.*
VENTILATION, *Mann.*
23 *Globe* ROOF VENTS, 1 *in Vestibule*, 10 *in Dining Room*.
4 " *Buffet*, 8 " *Kitchen.*
33 WINDOWS ON SIDES. GLASS, 22″ × 24″ and 9″ × 22″
Irregular SPREAD. SASH, *Mahogany.*
4 *Flexible* BLINDS *in Kitchen.* FRAME, *Cherry.* SLATS, *Cherry. Curtains at all other windows.*

[*For the Paint Shop.*]

PAINT—COLOR 1 *car B. & A., 1 car N. Y., N. H. & H. R. R.* } *Standard.*
ORNAMENTATION DESIGN, 1 *car B. & A., 1 car N. Y., N. H. & H. R. R.* } *Standard.*
LETTERING ON BOARD, 1 *car B. & A., 1 car N. Y., N. H. & H. R. R.* } *Standard.*
NUMBERED, *B. & A.* 224, *N. Y., N. H. & H.* 271.
TRUCKS, *B. & A., Furnished N. Y., N. H. & H. See Drawing,* 86 *B.*
INTERIOR FINISH, *Mahogany.*
HEADLINING, *Mahogany veneer, plain.*

[*For the Body Room Only.*]

16 *on one side.*
B.—WINDOWS, 17 *on one side.* GLASS, 22″ × 24″ & 9″ × 22″
ON EACH END.
SPREAD, *irregular.*
DOOR OPENINGS, 26.
PLATFORMS, 20½″ & 30″ STEP, *B. & A. and N. Y. C. & H. R. R. R.*
IRON DRAW BAR, *B. & A. on B. & A. car.*
CANOPIES, 7, *Old Colony on N. Y., N. H. & H. car.*
EXTERIOR, *Paneled.*
WINDOW FINISH, *square.*
VENTILATION, *Mann.*
INTERIOR FINISH, No. 14 *mahogany.*

[1 *For the Machine Shop*, 1 *For the Blacksmith Shop.*]

B.—TRUCKS GAUGE, 4′ 8½″ SPREAD, 11′ 0″
WHEELS, 42″ *Allen.*
AXLES, *N. Y., N. H. & H. R. R. Co.*
JAW " " " BOX NO. " " " BRAKE HEAD do. SHOE do. do.
CENTRE PLATE NO. 88 HANGER, 27⅝ bet. centres.
TIMBERS BRAKE BEAM, 4″ × 6½″
BOLSTER, *Compound* SAFETY BEAM, 3½″ × 8″
TRUCK BEAM, 6″ *channel* SPRING PLANK, 3″ × 12″
CROOKED END PIECE, 3¼″ × 10″ WHEEL PIECE, 4½″ × 10″
STRAIGHT END PIECE, 3¼″ × 5¼″
SPRINGS BOLSTERS 38 *5 plates Trip* 3″ × 11-32″ 13″ *over all and auxiliary.*
BEARING, *Ludlum's* 8½″ × 10″ 2 *Coils* No. 1 *Crown Bar.*
CHECK CHAINS, 4.
BRAKE, *Westinghouse Automatic.*

The Taper Fit.

This method of fitting holes has been used less than it should have been; it was too much trouble in the olden time. A straight hole and a straight plug was considered cheaper and therefore better. It cost little skill or wages for a good workman to bore a straight hole and turn a straight plug; while to taper the hole and taper-turn the plug, and make a finish fit, required skill and time.

For some purposes there is nothing that will take the place of a taper fit. Recently a crosshead pin of crucible steel was noticed in a cast-iron crosshead. It had two tapers, not on the same grade, one in one wing of the crosshead and the other in the other wing. The two tapers were not made by a single reamer with a uniform slant; they were different in diameter and in "slash," or degree of taper, and yet the fit was admirable. When the steel pin came to its bed, or home, it was secure without urgent persuasion; a slight tap of a soft metal mallet eated it. No keyway and spline was needed to hold this union as one, but a simple cross pin, only enough to prevent jar from starting the fit, was required.

These taper fits are useful when well made, from their readiness of removal. A taper fit means that the parts do not fit at all until "they are home;" whereas a straight fit must "feel its way" its whole length, and sometimes—as when a steel plug fits an iron hole—it must partly cut its way and seat itself. It costs more to make taper fits than straight fits, but when the more perfect union of parts is assured, and the readiness of the parts to be separated on demand is considered, it is the best fit of cylinder to cylinder that is possible.—*Scientific American.*

An Easy Test for Lubricants.

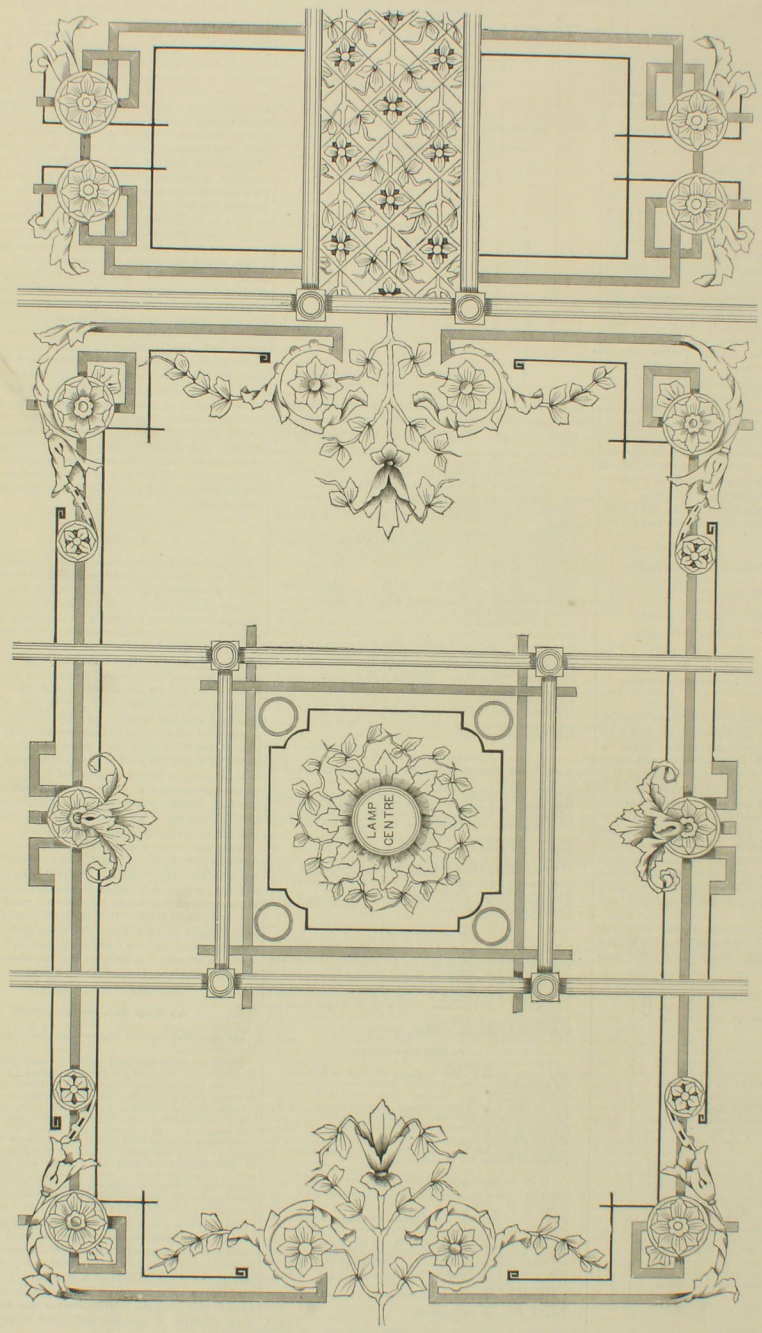
The *Saw-Mill Gazette* suggests the following easy test for lubricants:

The manager of any mill may, at very little expense, determine for himself all the conditions of safety and economy in lubricants as indicated by the standard of heat developed upon any given shaft. The apparatus required for this purpose is merely a thin brass tube, closed at the lower end, and two thermometers. The method of using this apparatus is as follows: Place enough water in one of these tubes that the bulb of the thermometer will be immersed; insert the tube in one of the holes in the cap of the journel so that the leaver end of the tube will be in actual contact with the shaft; hang the other thermometer free alongside; then gauge the relative heat developed with oils and with greases. Each man may thus satisfy himself as to which is the best and safest.

While this is a very fair test for the oil, so far as its heating under friction is concerned, it must be kept in mind that cool running is not a proof of low friction. A journal may run cool while it is wearing rapidly. It may also be cool while the friction is great. It is well to remember in all cases that cheap and simple tests can not be relied upon to give us all the information we may need in regard to the behavior of oils, fats and other lubricating compounds.

THE Pullman Car Co. are building 40 cars for the Brooklyn Elevated Railroad Co.

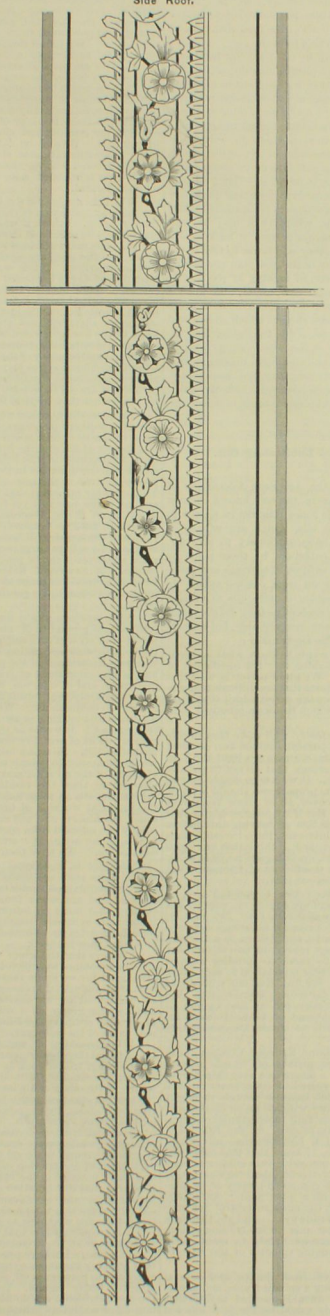
Clear-Story Roof.



PASSENGER CAR CEILING DECORATION.

Designed by Geo. J. Beckley, Draughtsman, Green Island, N. Y.

Side Roof.



Communications.

The Use and Abuse of Brakes.

To the Editor of the National Car-Builder:

Perhaps there is nothing of equal importance in railway practice that is so liable to be overlooked as the providing of an effective brake system for trains. Some of the brakes now in use are considered as very nearly perfect, but the subject has evidently not been thoroughly studied in al its bearings.

In the early days of American railways the wheel, chain and lever were considered very effective, and were suited to the light trains and low velocities of that period, but as the weight and speed of trains increased there was a demand for power brakes that could be applied and released instantly. The aim of inventors was to produce a powerful brake regardless of other considerations. Power and quick application were regarded as the main requisites. It did not seem to them that the sudden checking of a train moving at high speed was a dangerous proceeding, or that under ordinary circumstances it is not desirable to bring a train to a sudden stop. It is only in special emergencies that this is necessary, and herein lies the danger of a quick application of power brakes to a portion of the train only. If the brakes were so arranged that they could be applied to every wheel in the train, there would be less danger of derailment. With some of the power brakes now in use, only the locomotive and a few cars are acted upon, and if the train is a heavy one, and it is desired to stop suddenly on a curve, a derailment is likely to follow the too powerful application of the brakes to the forward part of the train, and but a slight or no application to the middle or rear part. When the power brakes on passenger trains are in good order there is little or no danger of derailment from a sudden and powerful application, but it frequently happens that there is some derangement that renders them inoperative, and the locomotive must be relied upon to hold the train to prevent accident. This is placing a train between two fires, as it were. The efforts to prevent an accident is the direct cause of trouble in another direction. When a train is running down a grade on a curve, and no brake power is available on the middle and rear portions, powerful application of the brakes to the locomotive and a few of the forward cars causes the flanges of the wheels upon which no brakes are acting, to be thrown forcibly against the outer rail, causing mounting or spreading of the rails and derailment. This is the natural result of centrifugal force combined with the suddenly checked momentum of the cars not held by brakes and having no hold on the rails other than the ordinary rolling friction; that is to say, the portion of the train that is suddenly checked is a dangerous obstruction to cars that are not held by brakes, by reason of their tendency to crowd each other past the obstruction in a tangent, assisted by momentum and centrifugal force. For these reasons it is important that all the wheels of a train be properly checked by brakes simultaneously. Moreover, if a small portion of the wheels of a train have to perform all the brake service, they are liable to be grasped too powerfully, causing the wheels to slide and flatten. It is a common complaint among trainmen, both here and abroad, that most of the power brakes in use are not effective for more than from five to eight cars on the front of the train. This is an evil that should be remedied as a measure of safety and economy in passenger service.

Another matter that needs attention is some means of rendering power brakes less liable to become inoperative, and they should be so simplified as to render their working easily understood by any trainman of ordinary intelligence. Most of the brakes in present use require the supervision of experts to keep them in working order, and it has even become necessary to establish schools for the instruction of engineers and firemen in the working of the delicate and complicated apparatus. In view of the responsibility involved, this is eminently proper. It may be said in respect to freight trains, that power brakes have been devised that operate as effectively on the rear cars of long trains as on the forward ones, and that no special training is needed for the working or repairing of them. Running switches can be made with them, the connections being designed with special reference to this. The demands of freight service call for heavier and faster frains, and American inventors have shown that they are equal to the task of providing the necessary brake appliances. These trains should be as completely under the control of the engineers as passenger trains are, although these are by no means exempt from accidents due to the failure of brakes to operate.

The great number of unexplained derailments justify the opinion that many of them are caused by the spreading of rails produced by a lack of brake power uniformly applied through the entire train. In nine years there have been 1,994 derailments reported on the railways of the United States, and 360 cases of spreading of rails. The cases of broken axles, of which 369 are reported, are doubtless due to a very considerable extent to the excessive torsional strain imposed on the few wheels that are subjected to the entire brake power of the train. Another matter worthy of consideration is the making of the faces of brake shoes parallel with the break beam. This wears

away the conicity of the wheel treads, and the wear continues until the shoe is worn to a contact with the entire face of the tread. So long as both coned and cylindrical treads are in use, the trouble can not of course be entirely obviated, but each road can fit brakes to its own style of wheels, which would be an improvement upon the present system of misfits. WM. S. HUNTINGTON.

The Stevens' Locomotive Boiler.

To the Editor of the National Car Builder:

The locomotive boiler of Mr. A. J. Stevens, which is illustrated in your January issue, possesses decided mechanical merit, and I am satisfied will give better results in service both as to economy of fuel and prevention of smoke and cinders than the standard construction. Historical accuracy, however, requires the statement that the design, while doubtless original with Mr. Stevens, is by no means a new one, being, so far as all essential features are concerned, an exact reproduction of that which was patented to the late James Milholland, formerly master of machinery, Philadelphia & Reading Railroad, Feb. 17, 1852, No. 8742. By reference to the drawing of the Milholland patent, a copy of which I send you, it will be seen that the arrangement of the large and small tubes and intermediate combustion chamber, is identical with that of the Stevens boiler.

The engines "Illinois" and "Michigan," of the above-named road, built at the Reading shops in 1852, were provided with boilers which were substantially of this construction, except that vertical flues were employed instead of the large tubes leading from the furnace to the combustion chamber. (See *Journal of the Franklin Institute*, April, 1853, Vol. 52, Third Series, p. 271.) These boilers were insufficient in grate area, having only 17 square feet for anthracite coal, but if proportioned correspondingly with the Stevens boiler, which has over 23 square feet for *bituminous*, there is no reason to doubt that their performance would have been such as to warrant their duplication in the later engines of Milholland. So far, however, as I know, he did not continue their use.

The Coventry return-tube boiler also illustrates the revival of an old design, a return-tube boiler being employed in the "Novelty," of the Philadelphia & Reading road, about 1848, in which the boiler and engine were on separate carriages. The "Novelty" was designed by G. A. Nicolls, and, as shown in the eight sheets of drawings of his patent, No. 5,787, of Sept 19, 1848, certainly bore an appropriate name. J. SNOWDEN BELL.

PITTSBURGH, Pa., Jan. 24.

Railway Companies as Manufacturers.

To the Editor of the National Car-Builder:

Your January issue contains some interesting suggestions under the heading of "Railway Companies as Manufacturers," the same being a portion of an article contributed to the *North American Review*, by Mr. W K. Akerman, late President of the Illinois Central Railroad Company.

While I agree with the writer that railway companies are not organized expressly for manufacturing purposes, I can not but think that such companies would find it rather difficult to keep their rolling stock in serviceable condition without shops suitably equipped for repair and construction work. A company that has, say, 1,000 cars, can not get along and make any headway without good shops and first-class machinery to keep up ordinary repairs, to say nothing of accidents and wrecks which are liable to occur on the best-managed roads. With this number of cars in service, some of them will be coming to the shop for repairs of some kind every day in the year. I know, in fact, from much experience as a master car-builder, that a road would be placed at a great disadvantage without facilities of its own to do the best kind of work in the shortest possible time.

It is conceded, of course, that railway corporations are organized for the special purpose of earning money and making dividends. But in order to do this, there must be systematic economy in the management, even to the smallest details. Many roads, it is true, rely largely on contract work to replenish their equipment, both of cars and locomotives; but would it be economy for them to abandon or reduce the capacity of their own shops and depend altogether on outsiders? I venture to say it would not. Doubtless there are car manufacturers in the country who can turn out as good cars in every way as the road shops can. But can it be said that, as a rule, contract work is as good as work done in the road shops?

The writer of the article referred to intimates that when the question of feasibility comes to be determined in the interest of the shareholders, the views of master mechanics and master car-builders will not be consulted. It is quite possible that this may be so. There are many managers who do not now consider the opinions of these men as important when such momentous questions are discussed. Nevertheless, I can say that I have had experience with contract cars and road-shop cars; and so far as my experience goes, the cars built by the roads are the best. I know of passenger cars of the latter class that have been twelve years in service and are about as good as new, having been in the shop only to be repainted and varnished. Other cars on the same road, that were built by contract, are only eight years old, and all of them have been stripped to the frames, and some of the frames partially renewed on account of slight work and incipient decay. But this, it will be said, is offset by getting these last-named cars cheaper in the first place. The experience of the road with which I am connected does not prove this to be the case. I assert, on the contrary, that cars built by the road cost less in the first place than the average contract cars do, while they have in them carefully-selected and first-class material. The cost, too, is fairly estimated and includes wastage, management, wear and tear of machinery, interest, insurance, taxes, etc.; so there is no going behind the returns.

In regard to the co-operative plan which the writer suggests—one repair shop to do the work of two or three roads—it may turn out to be quite a judicious move, and possibly railway companies will hasten to adopt it. But I suspect when they have furnished themselves with the necessary means for removing their disabled stock from all along their lines to the co operative shop, wherever it may be, and after it is there, bide their time for getting it back again, particularly in a busy season, they will begin to realize the cost and comparative economy of the new plan and the old one. It occurs to me, however, in looking at the matter from the standpoint of a master car-builder, that upon a long line or system of lines under one management, it would be a good idea to have one main shop at which all new and important work should be done, while the lighter and ordinary repairs could be done at the repair shops proper, located elsewhere on the line, and all subject to one management. This suggestion, however, may not have much weight, coming, as it does, from a source which Mr. Akerman does not think of sufficient importance to be consulted.

S. C.

Plain Words About Lubricating Oils.

At the recent meeting of the American Association of Mechanical Engineers, Dr. Arvin, the well known chemist of the Standard Oil Co., made some remarks in regard to the character of lubricating oils, which are worthy of careful attention by all who have machinery to care for. The Doctor's remarks were called out by those made by Prof. R. H. Thurston on the subject of bearings and lubrication. Such criticisms upon oil tests, coming as they do from one whose entire business is with oils of various kinds, will strike most of our readers, as they did the members of the society, as being not only valuable, but refreshingly frank and truthful. The Doctor said:

"To a practical man who wants to know what he needs to put upon his engine, the value of "the co-efficient of friction" is extremely low. We know perfectly well that it depends upon many conditions that are difficult to maintain and to understand. Even the wisest admit that there is very little yet found out which throws a practical light upon that subject.

For instance, we know perfectly well when they decide the co-efficient of friction of paraffine oil, on two polished surfaces made to fit perfectly, we gain no light at all on what we need to use. Things that do not fit equally well, or have the same finish. If we are to decide how to construct a bearing, what its proportions should be, how large a segment it should cover, all of these researches would be directly in point. But if we have an engine that runs hot, or a certain construction of bearing that makes it difficult to find a suitable lubricant, these investigations afford us no light whatever, and I think that any engineer will agree with me that, crediting all possible value of researches regarding the co-efficient of friction, what we want to know is vastly beyond that.

"For instance, an engineer comes to you and says, 'I was us ng such a paraffine and my engine ran cold; I am now using such a paraffine and it runs hot.' We find on examination that there is no practical difference between the two, but when we come to apply them to a bearing we find that for some strange reason the two oils did not work alike. When we apply them to spindles we find that two paraffine oils often bear no relation to each other in their practical behavior. We find that one will run at a much higher temperature for some obscure reason. We might think it due to its viscosity, but we find by our instruments that it does not depend on that. In some instances, too, the results which we obtain are exceedingly contradictory.

"The Rochester & Pittsburg Railroad Company run their cars with a bearing, the surface of which is composed apparently of babbit, as is a very thin film of lead—it appears to be lead—spread over the inner surface of the composition box, which looks as though it might be gun metal. They say they will run an oil on this soft bearing that I know positively fails under similar circumstances, and on the same class of cars, on the Erie, New York Central and Delaware & Lackawanna—just why I cannot say for the life of me. I know that that shaft will sink down on that bearing, and yet it runs cold, and runs on a very cheap oil. One of the Standard Oil Companies manufactures an oil which is composed largely of a mineral base, which is united with a fatty acid. All things considered, that oil has been the most successful for running cold of any oil used on railways. And yet that fails to equal some other cheaper oils on the friction-testing machines. We have had occasion lately to make some comparative tests on fast-running spindles of the Sawyer pattern.

"We have half a dozen oils from Europe and several made in this country: Taking a spindle frame, and adapting a dynamometer of my own, I expected to find that oils which had the best body would be the best oils for those spindles. I found I did not know anything about it. After having read many papers and listened to a great deal of talk from gentlemen who know a good deal about it, I found that the spindles did not bear out anything that I expected. Now, a spindle that was nicely fitted behaved in one way; but a spindle that was badly fitted behaved very differently. The effect of this was to establish a friction of its own in addition to the friction which we generally speak of as due to the oil itself. If we put on oil that had good body the heat increased very rapidly. Now, we should say at first that that was an objection to that oil. But we found after running them for a short time that the oils that gave us the best results in the economy of power where the ones that produced the most rapid wear. We found that after running constantly at some 6,500 revolutions a minute, it had lost as much as 1 of one gramme in actual weight. When we took another paraffine oil the wear was not one-half of that, and there seems to be no apparent reason for it.

"I have come to think lately that the question of wear on bearings, as ordinarily found, is one of vastly more importance than the cost of oil. One large millowner came to me recently and said that he wanted an oil for his spindles. He said he did not care what it cost. He said, 'After running some eleven mills for many years, I have discovered that we sustain such great loss by wear due to poor lubrication as to make the mere price of the oil unimportant.

"When the engines of the Brooklyn Bridge were started the faulty construction of the bearings and journals caused rapid heating. I think it was generally believed by the engineers who examined them that the construction was faulty. The main bearings were like those drawn on the board, and the pinching on the sides appears to have been such as described. While watching those bearings quite intently one day, I happened to put my finger on the shaft (which I think measures eleven inches in diameter) at a place where it showed extra pressure on the box, and I found it quite hot, while just an inch and a half from that section the shaft feld cold, showing how great and intense must be the heat generated when the conductivity of such a mass of iron failed to remove it. It seems to me that the conditions and behavior of those journals corresponded with what Prof. Thurston has just described; and the binding in all such cases being simultaneous with an increase of temperature, I am led to wonder if it be not due to expansion by heat rather than to yield in the journal.

"We generally find that where we can use oils of higher viscosity ordinary machinery bearings run colder. But in some instances of high speed and heavy pressure only thin oils answer at all, and the bearing must be flooded. I believe the engines of the Edison Electric Light Company, which run the dynamos in Pearl street, are rated 75 horse-power and run at the rate of 375 revolutions per minute. I am credibly informed that the oil they are using on these engines is the only sort yet found to run cold. This is an oil of about 32 deg. Beaume gravity, which is almost as light and fluid as common kerosene and requires to be supplied constantly. I have come to think that this arranging of a steady current of thin oil is a very desirable plan wherever it can be practically carried out, as in the case of the Sawyer & Rabbeth spindles and nicely finished and fitted bearings of larger dimensions like those in the machines these gentlemen have devised for testing oils.

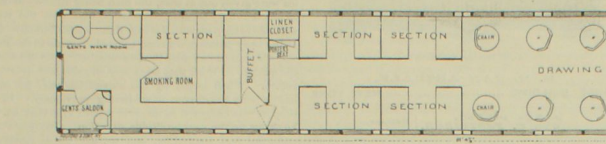
"With bearings nicely finished and journals carefully scraped and ground to fit, an abundant and constant supply of thin oil will give the best possible result in keeping the bearing cold and saving power. With such machines you may learn much of the proper proportions of bearings and of the conditions of friction in relation to pressure and speed, and of oils, too, under the exact conditions of these machines, but nothing of the requirements of machinery in common use. Why, these gentlemen think of a journal and bearing as two cylindrical surfaces in perfect contact! It would be more scientific and practical to regard the fit of ordinary bearings like that of a pea in a bushel basin. In many instances, one point of contact would be almost too much to expect, and the "body" or viscosity of the oil must make the fit. I know by my own observation that the results obtained in testing heavy lubricating oils on these machines do not correspond with the practical working of these oils on railway axles and other machinery, and any engineer to whom you might supply oils selected from such data would soon come back to you, as the saying is, "with tears in his fist and his eyes doubled up." We have been there—both sides.

"The fact is, the most important conditions under which these tests are made are the very ones that can only be maintained under special and unusual circumstances, and are never found in the great mass of machinery that must be lubricated. This makes the frictional tests by special machines worthless as a means of selecting lubricants, and a delusion to those whose opinions of oils are thus founded.

"I believe that the great value of these friction tests, and the machines by which they are made, lies in another direction; for we know that scientific research lies at the root of all industrial progress. But I think we must try an engine oil on an engine, a spindle oil on a spindle, and a wagon grease on a wagon, all as nearly as possible under the ordinary conditions, to learn anything of the real value of the lubricant.

"While speaking of spindle oils, I should have added that I found their bearing parts did not wear bright. I considered their frosted look as indicative of a friction I saw no way of estimating, although I was afterward to find wear. With oils of higher viscosity and heavier gravity the bearing surfaces polish like a mirror, even though the friction, judging by the power consumed, is much greater with the more viscous oils. I infer that we cannot judge of the actual friction occasioned by the moving surfaces in contact, while we are unable to estimate separately that friction attributed to the oil itself. For using a thin oil we decrease that one friction so greatly that we cannot note any lesser increase in the other which occasions wear. If it is true that the question of wear is frequently of paramount importance in choosing special oils, then a low co-efficient of friction is no measure of value, and our frictional tests are worthless as a means of judging.

"It is frequently said that we have petroleum oils which alone answer all requirements of lubrication. It is not so. I wish it was. I believe practical experience fully proves that in many instances compounded oils are best. Sometimes a thin petroleum oil, with a small portion of animal oil gives better results. You may find instances where the best petroleum oils do not answer on an engine, when lard oil or a mixture principally lard oil keeps the engine cold and is every way satisfactory. This is sometimes the case whether the petroleum be of heavier or lighter gravity than the lard oil. But I am glad to say these are rare instances, where petroleum oils do not answer every requirement.



Woodruff Combined Sleeping, Parlor and Reclining-Chair Car.

THIS car is 61 ft. 4 in. long over the body and 67 ft. 6 in. over all, and will seat and sleep 32 passengers. The various compartments and sections are shown in the plan. The inside finish is in mahogany, with silver-plated trimmings. Its outside appearance is that of a regular sleeping car. It is painted a seal brown, with black letter-board and gold ornamentation. The chairs are perfect parlor chairs in the day time and reclining chairs at night. The car is intended for new lines upon which parlor and sleeping car traffic is light, and also for other lines on which the bulk of this kind of traffic is not sufficiently large to justify the hauling of regular sleeping and parlor, or reclining chair cars, but which require equally good service in a more compact space. This, in many cases, will save railroad companies the cost of hauling an extra coach. The car is mounted on six-wheel trucks, with steel-tired wheels and French's elliptic and spiral springs.

Railroads of the State of New York.

The report of the New York Railroad Commissioners for the year ending September 30, 1884, contains the following grand totals of the business of the year, by which it will be seen that, in spite of commercial depression and its attendant drawbacks, there has been no falling off in the amount of freight and passenger traffic, as compared with that of the previous year, but a small increase. The total earnings, however, have fallen off nearly $8,000,000, which may be attributed to excessive competition The results which the figures disclose seem almost irreconcilable with the stagnation in general business which prevailed during the year covered by the report. Although the industrial depression was less severe during this period than it is now, the amount of business done by the railroads was enormous, and indicates a vitality in the movement of internal commerce that warrants a hopeful outlook for the current year, if not an early return of business prosperity.

Comparative summary of the most important financial results of the railroad operations in the State during the years ended Sept. 30, 1883 and 1884:

	1884.	1883.
Total number of tons of freight carried one mile	9,322,518,571	9,286,216,623
An increase of 00.39 per cent.		
Average charges per ton per mile	0.8629 cts.	0.89 cts.
Average expenses per ton per mile	0.0278 "	0.04 "
Average profits per ton per mile	0.1988 "	0.25 "
Total number of passengers carried one mile (exclusive of elevated roads)	1,729,953,020	1,720,377,410
An increase of 00.54 per cent.		
Total earnings	$126,204,164	$133,980,625
Average charge per passenger per mile	2.08 cts.	2.10 cts.
Average expense per passenger per mile	1.64 "	1.55 "
Average profit per passenger per mile	0.44 "	0.55 "
Total operating expenses	$86,891,759	$86,887,639
Total paid for interest	20,832,808	23,150 144
Amount of dividends paid	17,892,315	18,261,124
Percentage of net earnings to cost of road and equipment, as claimed in their reports	3.38	4.21
Total miles of road built in New York State	7,297.89	7,215.94
Total amount of stock and debt, Sept. 30	$1,268,220,758	$1,194,801,078
Total cost of road and equipment, as claimed in their annual reports	1,160,739,434	1,116,097,410

The Chicago Lumber Trade and Car-Building.

The *Northwestern Lumberman*, in a review of the Chicago hard woods trade for 1884, says:

"The requirement for car-building was steady, and nearly up to the usual amount The burning of the plant of the United States Rolling Stock Company in 1882, and its consequent suspension, deprived the lumbermen who handle that trade of one large customer, but the remaining ones, notably the Pullman Palace Car Company, have done a lively business, and have been the main support of two or three concerns. The first-named company now has its new works on the Calumet River, at Hegewisch, ready for operations, and will again be calling for timber and lumber. These car companies are heavy consumers of fine woods, and probably use over one-half of the mahogany and some other foreign woods brought to this market. A new development in this trade has been the use of yellow pine for car sills, plates and decking. Yellow pine is one of the strongest woods known, ranking alongside of ash and white oak in that respect and its cheapness makes it peculiarly attractive. As the demand now in passenger car building is for solid finish, the requirement is of importance. Red woods have been preferred, and mahogany and cherry are favorites, with other more rare woods used for variety. These finishing woods largely pass through the hands of regular dealers, but as much cannot be said of the coarser woods used. Much of the oak, ash, whitewood and yellow pine consumed is bought by agents of the companies at the mills, and some through commission men and yard dealers who make a speciality of that trade, but the yard dealers generally get only occasional bites at the cherry, while many of them never expect to sell to these consumers. The large companies, as also the larger agricultural implement and wagon makers, can do better than to buy at the yards."

The Richardson Safety-Valve Patent.

A decision was rendered, Jan. 19, by the Supreme Court of the United States in the two patent cases of the Consolidated Safety-Valve Co., of Hartford, appellant, *vs.* the Crosby Steam Gauge & Valve Co.—Appeals from the Circuit Court for the District of Massachusetts. These were suits brought by the appellant against the appellee for alleged infringement of two patents granted to George W. Richardson, Sept. 25, 1866, and Jan. 19, 1869, for certain improvements in safety valves. The defense set up by the Crosby Co. was want of novelty in Richardson's alleged inventions. The court below held the defense good, and dismissed the Consolidated Co.'s bill of complaint on the ground that Richardson's patents were invalid. This Court reverses that decision, and holds that Richardson's inventions had not been anticipated by others, and that he was "the first person who made a safety valve which, while it automatically relieved the pressure of steam in the boiler, did not, in effecting that result, reduce the pressure to such an extent as to make the use of the relieving apparatus practically impossible, because of the expenditure of time and fuel necessary to bring up the steam again to the proper working standard." His patents are held by this court to be valid, the valves made by the Crosby Co. are declared to be infringements, and the decrees of the Circuit Court are reversed, with directions to award an account of profits and damages on the patent, whose term has expired since this suit began, and to award a perpetual injunction on the other patent. Opinion by Justice Blatchford.

The Massachusetts Couplers.

A correspondent of the Boston *Herald*, referring to the recent meeting of the representatives of sixteen New England railroads, in Boston, to consider the merits of the five couplers approved by the Massachusetts commissioners, says:

"They discard three of the couplers selected and recommended by the commissioners because they will not work together automatically, and consequently would materially increase the danger to trainmen in coupling cars (which important fact is supposed to have been overlooked by the commissioners), and yet they select and recommend the use of two of the couplers chosen by the commission (the Ames and the Cowell) which these same delegates concede will not work together automatically, while they discard the United States, which they say will, under favorable circumstances, connect with the Ames. They thus propose to lessen the risk to trainmen by merely reducing the number of non-connecting couplers to be put in use from five to two. Have they not, in their effort to overshadow the wisdom of the commission, subscribed themselves like Dogberry?

"The delegates pretty clearly conceive an incontestable fact, that the safety of trainmen is best to be assured by having a uniform coupling in use on all roads where cars are interchanged, and they admit that the trainmen's peril will be increased by the use of different devices on the different roads, which will not couple automatically. Why do they then recommend the adoption of two couplers on the New England roads, which, they say, will not couple together automatically? The whole railroad community has an interest in this question. It is to be hoped that the Legislature will display a more solid wisdom than is suggested either by the commissioners or the delegates, and will adopt some one coupler which will be within the reach of all railroads in the country, and which is susceptible of universal use. Very few of the roads can afford to discard the old link pin coupling and adopt some new device which will not readily connect with the link and pin automatically. None need do it if the real purpose be to secure a uniform coupling which will act automatically with any other device, under any circumstances common to railway traffic, and which is so inexpensive as to insure universal adoption.

"The Perry Brown Patent, which was exhibited and tested before the commission last September, simply gives automatic action to the old link and pin draw-head, at the trifling cost of 20 cents per draw-head. It couples automatically with its kind, and with all other devices, on even or uneven surfaces, and has the strength and durability of the old link and pin. Why overlook this device in making the selection of a coupler for common use?"

Electric Train Lighting in England.

Engineering says: The London, Brighton & South Coast Railway Co. have three electrically lighted trains running on their lines, and a fourth is nearly ready to be put in service. This company was the first to make trial of the electric light, and two years ago the Pullman express was fitted with secondary batteries. Since that time, the subject has been pursued until a really practical system has been evolved. In the present trains the current is generated in the van without the use of an auxiliary engine, and sufficient storage power is provided to supply light during stoppages, temporary break-downs, and the like. No attendant is required, and beyond the ordinary inspection and care which all machinery demands, there is no trouble involved in the arrangement. The dynamo is driven by bands from pulleys on the axle to the van, a countershaft under the floor serving to give the required increase of speed. Leather link-belts are employed, there being two from the axle to the shaft and one from the shaft to the dynamo. It is, however, intended in future to use two for this latter purpose, and then the arrangement will be practically free from danger of breakdown from the failure of the bands. One train has already been running 11 months, during which time it has made 2,352 trips, equal to 27,322 miles, so that the system may be said to have passed the experimental stage. Of course it is not of universal application. The train can not conveniently be broken up, but for made-up trains it seems to fulfill all the essential conditions. The illumination is most ample, far better than the most careful oil or gas lighting, the dynamo runs without supervision, and the expenditure of power is not great. A current of 40 ampères and 44 volts represents about 2¼ electrical horse-power, or say 4 indicated horse-power; and besides this, there is only interest, depreciation and renewal of lamps to provide for, which may exceed the cost of the present oil and gas lighting.

Master Mechanics' Association.

The following are the Committees and Subjects for Discussion at the next annual convention, which will be held at Washington, D. C., commencing June 16, 1885:

Improvement in Boiler Construction.—J. Johann, Wabash, St. Louis & Pacific; J. Davis Barnett, Midland; Allen Cook, Chicago & Eastern Illinois.

New Plans for Construction and Improvement in Locomotives.—W. Woodcock, Central of New Jersey; G. W. Stevens, Lake Shore & Mich. Southern; A. W. Sullivan, Illinois Central.

Improvement in Valve Gear.—Chas. Blackwell, Norfolk & Western; J. F. Devine, Wilmington & Weldon; M. M. Pendleton, Seaboard & Roanoke.

Best Metal for Locomotive Bearings.—James M. Bcon, New York, West Shore & Buffalo; J. S. Graham, Lake Shore & Mich. Southern; J. P. Hovey, Rochester & Pittsburgh.

Steel Castings and Locomotives.—R. W. Bushnell, Burlington, Cedar Rapids & Northern; Jno. Black, Cin., Hamilton & Dayton, T. J. Hatswell, Flint & Pere Marquette.

Driving Wheel Brakes—To what Extent is Their Use Advisable?—C. Berkley Powell, Old Colony; J. F. Crockett, Boston & Lowell.

Is the Frequent Testing of Boilers by Hydraulic Pressure Advisable?—H. N. Sprague, (H. K. Porter & Co.) Pittsburgh; W. L. Hoffecker, Ohio & Mississippi; D. O. Shaver, Pennsylvania.

Smoke-Stacks and Spark Arresters.—W. F. Turreff, Cleve., Col., Cin. & Ind.; J. B. Ross, New York, Lake Erie & Western; W. T. Smith, Kentucky Central.

Shop Tools and Machinery.—Jno. Hewitt, Missouri Pacific; Howard Smith, St. Louis Bridge & Trans. Co.; O. A. Haynes, St. Louis, Iron Mountain & Southern.

Associate Members to Read Papers at the Eighteenth Annual Meeting.—Willard A. Smith, *Railway Review*; F. B. Miles, Philadelphia.

Committee of Arrangements for Eighteenth Annual Meeting.—E. H. Williams, Baldwin Locomotive Works; S. A. Hodgman, Phil., Wil. & Balt.; T. L. Chapman, Chesapeake & Ohio.

Railway Exhibits at New Orleans.

Among the noticeable exhibits in the main building are four locomotive engines and tenders from the celebrated Baldwin Locomotive Works, at Philadelphia, embracing different styles, from the heaviest freight engines to the more elegant passenger motors, built for speed. The Pittsburgh Locomotive Works show an engine and tender, of elegant design and perfect finish. The Rhode Island Locomotive Works show two engines and tenders, one for standard gauge and the other for narrow gauge tracks, both of these are beauties that would charm an engineer and win his love at first sight. The Roanoke Machine Works, of Roanoke, Virginia, a little inland town in the upper valley of Virginia, show a very substantial looking locomotive engine made at that establishment. It is a surprising development for the mountain range of the Old Dominion, and shows what can be done under the relative disadvantageous circumstances of distance from great cen-

ters of labor and supplies. The same establishment also exhibit box and flat freight cars of superior quality. In the matter of railway cars, the Tubular Rolling Stock Co. show their peculiar and excellent box and flat cars, for freight, manufactured by the Railroad Equipment Co., of Roanoke, Va. The Jackson & Sharp Co., of Wilmington, Delaware, exhibit the Woodruff sleeping car, well-known for its many conveniences and improvements. The Harlan & Hollingsworth Co. exhibit a first-class passenger coach of superb design and finish. The Lobdell Car Wheel Co., of Wilmington, show a very extensive and superior line of car wheels. J. G. Brill & Co., of Philadelphia, exhibit a street railway car that is certainly superior to anything in the car line ordinarily observed hitched to horses or mules. So also the Fegel Car Co. of New Utrecht, N. Y., have a horse car on exhibition of superior excellence. —*Cor. Chicago Jour. of Commerce.*

New Publications.

Seventeenth Annual Report of the American Railway Master Mechanics' Association.—This report is uniform in size and appearance with previous ones, and contains the reports of committees and discussions at the convention at Long Branch last June. A large portion of it is devoted to the subjects of locomotive boiler construction and improvements in locomotives. The committee reports on these subjects are accompanied with a large number of well-executed engravings, showing the peculiarities of boiler construction upon several leading roads. Considerable space is also given to the subject of smoke-consumers and spark-arresters, with illustrations and detailed reports of experiments and tests. There is an interesting report upon valve-motion, with illustrative diagrams; also reports upon balance slide valves; improvements in shop tools and machinery; the best materials for truck and tender wheels; and the best method for lubricating valves and cylinders. These reports and the discussions thereon have already been published in most of the railway journals, and need not be referred to more particularly at this time. The report upon the coning of wheels is an exception, however. It consists of a large number of letters, containing the views of prominent master mechanics on the subject, the reading of which was dispensed with at the convention for the purpose of having such engravings prepared as the supervisory committee might think necessary to go with it. The report, as now published, will be found extremely interesting, as containing the views of practical railway men upon this much debated subject.

The volume contains the usual supplementary matter, comprising the constitution of the association, lists of members, committees appointed to make reports at the next annual meeting, list of officers, etc. The number and excellence of the engravings and the arrangement of the matter are all that can be desired, and, as a whole, the report is an additional evidence of the increasing usefulness of the association in promoting the objects at which it aims.

The Principles of Ventilation and Heating and their Practical Application. By John S. Billings, M. D., L. L. D., Surgeon, U. S. Army.—This work is an elaboration of a series of articles entitled, "Letters to a Young Architect on Ventilation and Heating," published a year or two ago by the *Sanitary Engineer.* The author discusses these subjects from a later stand-point than most of the current treatises have done, and having the advantage of a scientific investigation of the principles involved, has not been led into the absurdity of quoting the figures and estimates of English authorities as being applicable to this country. In what he does quote, however, he recognizes the fact that one man's opinion who is right is better than the opinions of any number of men who are wrong. Clear and self-evident as this is, it has nevertheless been the practice of most writers on these subjects to balance the opinions of the many who are in error against the very few who are in the right. Car-builders who desire to build cars that properly combine the means for heating and ventilation can hardly fail to obtain useful information by a careful perusal of this book, in one of the early chapters of which will be found the following suggestive statement as to dwellings: "In this climate it is impossible to have at the same time good ventilation, sufficient heating and cheapness." This has reference, of course, to the Northern States, and if it is true as to dwellings, how much more true must it be in respect to railway passenger cars, moving in all sorts of exposed situations and at rates of speed that produce an atmospheric resistance that is equivalent to high winds! The volume is 6 x 9 inches in size, and contains 216 pages and 72 illustrations. Published by "*The Sanitary Engineer,*" New York.

The Woodbury, Merrill, Patten & Woodbury High-Pressure Air-Engine.—This is the title of pamphlet in which the construction and operation of this engine are illustrated and described. It is issued by the Hinkley Locomotive Co., of Boston, who are the manufacturers of the engine, and who now offer it to the public in the belief that it is the best motor at present known to the world. In its operation the air is heated and cooled, or expanded and contracted, at each revolution, but is not exhausted. The waste, if any, is supplied by a small air pump, which also serves to increase the pressure in the cylinders to as many atmospheres as are required. Unlike other air engines, the size is not limited, but can be made as large as the sizes of steam engines, the air pressure being increased to any desired extent. It is said to be safe, economical, durable, and noiseless in running, requiring but little attention, and occupying less room than steam engines—the large sizes especially. The steadiness and regularity of the motion make it particularly well adapted to the running of electric-light dynamos and other machinery in which a uniform movement is essential. The sizes in the pamphlet are numbered from 1 to 7, or from 5 to 150 horse-power, as indicated in actual use. The utility of the motor has been perfected and demonstrated by many years of costly experimenting, and it is likely to attract the attention it deserves in an age of mechanical and scientific progress. Information in regard to it will be furnished upon application to the Hinkley Locomotive Co., Boston, Mass.

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EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock, construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notices of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of each month.*

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WILLIE H. GRAY, 306 *Olive Street, St. Louis, Mo.*

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PIECEWORK IN CAR CONSTRUCTION.

The introduction of piecework into an establishment which has always paid its men by the day, usually produces incidents which are a sarcastic comment upon the way the men have been in the habit of doing their work. No matter how honest a man may be, there is a stimulus about piecework which usually increases very considerably the quantity which he will finish in a day. Two incidents which illustrate the difference between working for the shop and working for one's self, happened a long time ago in the establishment of Mr. John Stephenson, of New York. The first one was in the room where the glazing was done for the old fashioned stages. Business was very brisk, and the works were crowded to turn out omnibuses fast enough. Everything hung upon getting the sashes as fast as the bodies were finished, the sash room delaying all the other departments. Two men and a boy were all that could be comfortably worked in the room, and no amount of coaxing would enable them to keep up with the demands. In despair it was at last decided that piecework should be tried, and so the necessary calculations were made, and the head man in the room was given the work at a fixed price per sash. Much to the surprise of every one he discharged the other man on the work, quit his early and late overtime work, and with the aid of the boy not only caught up with the work but was always able to be up with all the other departments. The room, which was always supposed to be too small for the glazing of the establishment, never required to be enlarged, but served its purpose as long as omnibus building was the important feature of the business. The next place in which the establishment was crowded was in the body-painting room, and here the plan of piecework was tried as a last resource before enlarging the room in which it was done. Some misgiving was felt in regard to this experiment, as it was thought the men were working as hard as men could work with justice to themselves. Finally, the price was taken at what was a fair average day's work, and the bodies were given out at that, the men being allowed to earn as much as they pleased. The result was that the room was able to keep up with the rest of the establishment. One of the body painters who had learned his trade in the shop, and who had grown up in the business, habitually did double the quanity of work that he or any one else had ever done before. When asked by the superintendent, he could hardly deny the charge of soldiering previously. In the shop he was badgered so much in regard to it that at last he threw up the very profitable situation. Incidents like these are very suggestive, and usually cause some surprise among those who have never seen the piecework system in operation.

The basis upon which it is conducted in different shops varies widely. Some shops aim to take all the gain, cutting down the price so low that a man can only make, by the utmost exertion, the same wages as if he were employed by the day. This, on the face of it, is a great gain, but the gain is only apparent, and not real. Other systems, while they allow the men to make more money, largely increase the economy of the establishment. Mr. Stephenson's rule for piecework is the most liberal of any that we know of. He takes the average day's work of a skilled man and makes this the basis of payment. Usually, the rate is taken so as to make the quantity below that which a good man can produce. In some shops the price of piecework is 33 per cent lower than the same work done by the day. The idea of this is, that a man working for himself will do 33 per cent more than he will when working by the day, and all this gain they expect to get. The result of this is, that the good men will not stay, and so there is less work done by each man. Those who stay are of a lower grade than they would otherwise be. There is another plan by which the men are paid high rates of wages and get a proportionally large quantity of work out of them. This plan is to introduce, as far as possible, improved methods, and then after making an estimate of the saving divide the gain equally with the men. In one shop where this is done there is a constant stimulus to the men to make such improvements of machines and methods as may be possible, because at any time they can have a new adjustment of prices, and may reap the advantage of any change in working which they may have invented. This plan gives the best class of men unlimited opportunity for money earning, and at the same time is constantly reducing the cost to the shop of manufacturing. Where men are only allowed to earn day's wages, those who can do more than that will not stay, and for those who do stay there is no inducement for improvement. In such shops the alteration of a machine which would double its capacity would only result to the man who suggested it a cutting down of his wages proportionately. In the other shop it would mean an increase of wages, and he would be very likely to have the problem of reducing the cost of manufacturing constantly in mind.

The plan which is frequently adopted, of allowing a man to earn 25 or 33 per cent more than day wages and never to exceed that, though not the most liberal one, does very well for some kinds of work. This policy does not do much toward bringing in a high priced class of labor, and this should be the indirect aim of every system, because the more a man is paid the more work may be expected for a unit of money. This paradoxical fact has been proved over and over again. The men getting the highest wages do a given quantity of work for less pay than another set of men on the same work elsewhere who are paid less per day.

A BRIGHTER OUTLOOK.

Since the beginning of the year there have been many significant signs of a revival in business, and which warrant the belief that the prolonged stagnation is nearing its end. These signs are, in fact, multiplying from day to day to such an extent as to inspire a very hopeful feeling as to the future. History is said to repeat itself, and this seems to be true with respect to periods of activity and dullness in trade. Panics come and go, and good times alternate with bad in a sort of regular series. The business paralysis which appears to have reached its culmination at the close of the past year is, or was, by no means a permanent one. Nobody supposes that the vast accumulation of idle capital with which the money market is now glutted is always to remain idle, or that the stock market will never again become excited by advancing prices. Sooner or later a reaction is sure to come. Rose-colored predictions will not hasten it nor lugubrious croaking retard it. It may not be as energetic and violent as the great boom of '80 and '81, nor is it desirable that it should be. Capital now is more timid and cautious than it was then, and will consequently move with slower pace. But those who control it know very well that when values touch bottom an upward movement is inevitable, and then, if ever, will be their time to sail in.

What is wanted, however, is not a spasmodic, short-lived reaction, but a genuine and permanent one that will not shake confidence in its continuance at the very start by an abnormal, speculative rise in the prices of materials and labor. All the existing elements of the problem seem to point to an early and gradual resumption of activity. The excitement of the election is over, food products were never

so cheap and abundant, a general adjustment of the scale of wages in all branches of industry has been going on during the period of depression, stocks of all kinds of manufactured articles have been reduced in the meantime, as well as excess of production, while the capacity of the country for consumption is as great as ever, and is sure to keep on increasing. But the most decided indications of a change for the better, is the recent starting up of mills and factories that have long been closed. There is also a very perceptible increase in activity in the iron and steel trade, and several important orders have recently been placed for cars and locomotives. Announcements of this kind are more frequently met with in our exchanges of late, and may be regarded as heralds of the good time coming.

SAFETY APPLIANCES FOR THE PROTECTION OF TRAINMEN.

This subject was discussed at the December meeting of the Western Railway Club, and those who took part in the discussion were men of large experience in the car departments of a number of important roads. Considering how much has already been said at the annual and monthly meetings of car-builders upon safety appliances as adapted to freight cars, it was hardly to be expected that any new ideas would be presented, or any definite or unanimous conclusions reached. And such seems to have been the case. There was, it is true, an interchange of ideas that have been interchanged so frequently within the past few years as to become a common possession among railway men, and capable of being summed up in a few words. Some thought ladders should be placed on the ends of cars, while others preferred to have them on the sides. Yard and trainmen, it was said, wanted the ladders on the ends, but managers and superintendents thought it was safer to have them on the sides. It was also suggested that side ladders were more dangerous in yard switching, and end ones safer on the roads. With respect to dead-blocks, it was stated that railway men were about equally divided as to the utility of single and double blocks; and one of the speakers said that dead-blocks caused many accidents, and he would like to know what benefit they were to cars. On the other hand, it was said that they protected the cars and men both. There was no better way than to give the men a "stick" to handle links with when coupling; and per contra, the men wouldn't use the sticks, but preferred to take the risk of using their hands. What use is there, then, it was asked, in going to them for information about coupling or the best place to put ladders. There was no way but to have an automatic coupler. Such a device, it was said, would do away with two-thirds of the causes of injuries to trainmen.

The Western Railway Club, like other organizations of the kind, is not expected, of course, to take such action upon the questions discussed as will be conclusive and final. The most that it can do is to embody its views in the form of resolutions, and the greater the unanimity the more effective will be its influence. The essential thing is to agree upon something. But so long as the discussion of the same subjects is only a reiteration of the same conflicting views there is practically no progress made, and everything upon which harmonious action is necessary remains unsettled, and will so remain until there is a compromise or a surrender to a greater or less extent of individual opinions.

What we would call attention to more particularly in connection with the discussion we have so briefly summarized is the fact that the Master Car-Builders' Association, some five years ago, adopted certain specific recommendations as to the position of brake-shafts, steps, ladders and handles on box and stock cars, with a view to the better protection of trainmen; also the width of running-boards was specified and the distance they should project beyond the end boarding. These recommendations, it will be remembered, were fully discussed at the time, and the action of the association was regarded by at least a majority of its members as final, the resulting benefit being entirely dependent upon the adoption of the recommendations by the roads themselves. Yet, from the tenor of what was said by the members of the club, it does not appear than any particular heed had been given to this action of the association, but, on the contrary, it seems to have been generally overlooked and forgotten. Mr. Kirby, of the Lake Shore road, who, as chairman of the committee on the subject, was the most actively instrumental in maturing these recommendations, was the only one who referred to them, and in doing so he made the very pertinent suggestion that if they were not to be carried out he could not see that any good was to be derived from a discussion of the matter. But it was discussed, nevertheless, very much as if it was a new topic, about which nothing had yet been done to bring about the needed reforms.

In regard to dead-blocks, there was the same apparent indifference to the recent decisive action of the association in prescribing the respective dimensions of double and single blocks. The drift of what was said seemed to indicate that the question was still an open one. It may be said in extenuation, however, that the members of the club had probably not then seen the official report of the Saratoga meeting of the association, at which it was decided that the distance apart of double blocks should be 22 inches from centre to centre, with a space of 14 inches between them, and that single blocks should not be less than 30 inches long. This arrangement will hardly permit the single ones to go between the double ones and catch the men, as was suggested by Mr. Mackenzie. If a double or compromise standard is, as it seems to be, the only means by which the existing diversity can be avoided, the positions and dimensions of the double and single blocks, when once determined upon and approved, as they have been, by a two-thirds letter-ballot vote, should be considered as settled, and the debate closed at least for the time being. It is a matter which vitally concerns the great army of rail way employés whose busines it is to handle freight cars, and the sooner it ceases to be an open question the better.

We have said this much, taking the views expressed at the December meeting of this club as a text, not because these views and the way in which they were presented are materially different from the current discussions at other meetings of similar organizations elsewhere; but because they exemplify the tenacity of individual opinion among the heads of railway mechanical departments, and its effect in preventing the adoption of well considered recommendations made by the Car-Builders' Association, and which might just as well not be made if no heed is to be given to them. And the question may even be suggested, whether any very great advance is made toward uniformity in freight-car attachments, if what is said at these meetings is to be in the main a stereotyped repetition of commonplace arguments that are as familiar as household words to everybody who knows any thing about railway operation. In a practical point of view, it is as necessary for members of railway clubs to try to reconcile conflicting views as it is for associations of larger calibre or railway companies themselves. So long as there is no concession there can be no mutual co-operation, but only an agreement to disagree, and consequently no end to diversity and complication.

HEAVY AND LIGHT TOOLS.

There is a general demand, at the present time, from manufacturers and machinists, for strong, powerful tools, capable of taking as large cuts as the work will stand, and geared to the highest speeds that are practicable. Tool makers in all parts of the country are overhauling their patterns, increasing the weight of bed-plates and frames, and adding to the stiffness in all directions, while at the same time feed-motions and driving gear are redesigned and made more powerful. In doing this, they are but complying with the strict requirements of the trade. Where such tools can be kept up to their full capacity, doing the work for which they were intended, they are undoubtedly the most economical, but there are many shops in which a tool of this class can but rarely be used to the full extent of its capacity. For many classes of work, however, such a tool is manifestly too clumsy and altogether unsuitable, as, for example, when an 18-inch lathe is needed for turning up a lot of light rings, or there is a large quantity of light work to be done. Light lathes for these purposes fill the bill both from the commercial and mechanical stand-point. Having strict regard for the character of the work to be done, the best tool makers have reached the conclusion that there should be about three different patterns for each size of tool. Of these, the first and most important is the machine which is capable of doing all that can be required of it, able in fact, to do all that the work will stand. The second or intermediate tool should be one adapted to do a variety of work and to be useful in a wide range. Lastly, comes the light tool having the same capacity as the others, so far as size is concerned, but intended to do a class of work that could not be conveniently handled on either of the other styles of machine.

Buyers are now very frequently carried away with the fashion, and because it is the correct thing to take the heavy cuts with fast feeds, they select with a view to the number of pounds of iron which they get, and the strength and stiffness of the tool, rather than with reference to the character of the work they are doing and how it can be produced in the most economical manner. Practically, the price paid for the tool which will do the work in the best and cheapest manner is of no consequence. The difference between the lowest-priced machine tool to be found in the country and the best one which money can buy for a given purpose is so small, compared with the difference in the amount and quality of the product, as to make the first cost an entirely secondary consideration.

CAR TRUCKS.

It is now very probable that before the close of the present year the detailed specifications for a standard freight car truck will be agreed upon by the Car-Builders' Association and submitted to the railway companies for approval and adoption. In view of the numerous defects in the best trucks now in service, some of which, it is not too much to say, are inherent in the nature of the structure, it is not to be expected that the standard to be recommended will be more than approximately perfect. It is one thing to prescribe the dimensions of the various parts and how they shall be connected, and another thing to make sure that the workmanship shall in all respects be as complete and perfect as the design. The ability of the railway mechanic in this matter is taxed, not only in devising the ways and means by which existing defects in construction may be avoided, but the first cost must be kept down to the lowest point, or, at all events, it must not exceed the average cost of the most approved trucks already in use, blinking out of sight the essential point, that the economy of the thing does not necessarily hinge upon the first cost, but upon the repairing that will have to be done during the average life service of the truck. Aside from defects in constructive design, or such as are purely mechanical, the controlling consideration of first cost has doubtless been a very great obstacle to improvement in the past. Master car-builders have been afraid to do what they wanted to do, and what would have been true economy in the end, for fear the cost of a truck would exceed that of some other truck which the managers considered equally as good.

Aside from considerations of cost, the diversity in the quality and patterns of wheels has been and will continue to be a serious obstacle in the construction of a mechanically perfect truck. Car-builders are not wheel makers. They must make use of wheels supplied by manufacturers, some of which are poor enough, and at the same time good enough for the price. They may not be round, nor balanced, nor of the same diameters, nor of uniform section of flange. There are many nice points in the rest of the structure which do not, as a rule, receive the attention they deserve, and for this the car-builder is responsible. The axle centers may not be parallel, the frame may not be at right angles with the axles, the journal boxes and bearings may be imperfectly made and badly adjusted to resist the strains to which they are subjected. We plume ourselves, and not without reason, upon the superiority of our "bogie" system, but it is a question whether the merits of the system, as such, have as yet been as fully developed as they will be when its component parts are designed and adjusted with a greater degree of mechanical precision than they now are.

But with all the acknowledged defects of even the best of our bogie trucks, as adapted to the existing requirements of traffic, it must be admitted that as a piece of mechanical handiwork they have thus far made a wonderful record. A superficial glance at a six-wheel passenger car truck reveals what appears to be, and really is, a mass of complication that might in a stationary machine be kept in good working order; but in view of the weight it carries, the curves and inequalities of the track, and the speed with which it moves, it is a matter of wonder how it lasts as long as it does, or holds together for a single day even, instead of going to pieces and piling itself and the entire train in a heap of promiscuous ruin. The same may be said, with but little modification, of four-wheel passenger trucks, and the far greater number of the more rudely and cheaply constructed trucks of freight cars. Of these latter, there are nearly a million in actual service when the movement of freight on our roads is fairly active; and the number of trucks under passenger-train cars will aggregate in the whole country very nearly 50,000. No carefully compiled statistics are needed to show how very small comparatively is the number of accidents due to the failure of trucks, imperfect as they are in so many of the details of their construction. They have performed an incalculable amount of work, and their capacity for doing it is in the highest degree creditable to the ability and skill of the car-builders of the country. What is now wanted is not only a freight car truck free from defects which are clearly remediable, and capable of carrying maximum loads of 40,000 pounds of freight, but a truck of such improved construction as to make it for the interest of railway companies to adopt and use it for all new cars, instead of continuing the diversity of styles and patterns now existing.

A NEW STYLE OF ROOFING.

The materials now in common use for roofing purposes are in many ways very unsatisfactory. Each one has its own peculiar disadvantages besides those which are common to all or nearly all. The materials in general use are shingles and slate for roofs having a sharp pitch, and for flat roofs, tar and gravel, tin, felt, and in a few rare instances, copper, iron, plain and corrugated, zinc, and, lastly, cotton duck, painted. The general tendency at present to build flat roofs makes it very difficult to find a suitable covering material for them, as they are much more exacting in their requirements than roofs having a steep pitch. On a steep roof, slate or shingles, though by no means water tight, will perfectly shed the rain and keep out the weather, but put them on a flat roof and the conditions are so altered that they are no longer weather proof. Practically, the flat roof has to be as tight as the bottom of a reservoir or tank, and the only difference seems to be that the head of water is very limited, not usually exceeding a foot. Under some conditions, however, a flat roof may be called upon to resist a pressure of from 18 inches to 3 feet of water.

In tin, iron, zinc and canvas roofs, these materials are only the foundations for the real resisting material, which is the paint. The paint has to keep the roof tight, protect the covering material from the weather and take all the wear and tear. Roofs of this kind may with propriety be called paint roofs, and their durability is measured by the length of time the paint will resist the weather and be

waterproof. With both tin and iron the moment the metal becomes exposed to the air, that moment destruction commences and goes on rapidly. If rusting has begun at any point on the surface of the tin or iron before the paint is applied, the rusting will continue under the paint, and will proceed until a hole is eaten. The iron has such a strong affinity for oxygen that it takes it up from the paint, which in turn is constantly absorbing it from the air. The cotton roof has a great advantage over the tin, because it does not rust, and is perfectly protected by the paint. Cotton, however, has certain other disadvantages which make it hardly suitable for general use, though admirable for many purposes. The gravel roof, when well laid, gives very fair satisfaction, but it is constantly undergoing a process of decay, and, like the paint, has to be renewed too frequently to be perfectly satisfactory, while it has the further disadvantage of being very heavy. For foundry purposes, and for places where there are acid vapors rising from below and reaching the under side of the roof, the gravel and canvas roofs have very decided advantages over tin, iron or zinc, these latter disappearing so rapidly as not to be worth putting on. First cost is another disadvantage which has to be taken into account in designing a roof. We say *dis*advantage, because the roof must be low in price, no matter how good it may be.

What seems to be needed is a durable flat roof which will give as good results at as moderate a cost as does slate upon steeply pitched roofs. Some years since we had occasion to examine a very curious roof in Burlington, Vermont, designed and put on by Mr. C. C. Post, of that place. It combined most if not all of the essentials of a good roof, and as it was not a patented design, and was free to all who wished to use it, we took some pains to investigate its construction and ascertain its durability. The pitch was as flat as is usually seen. The material was slate laid in a compound of coal tar and slate-dust, or coal tar and Portland cement. The roof was first covered with matched boards in the usual way. The tar was then prepared by adding Portland cement to the tar till it became thick enough when cold to stick to the slate and at the same time not stiff enough to chip or crack. Where slate-dust can be obtained this is quite as good. The mixture is made so stiff that it will not flow in the hottest weather, and at the same time will not crack in cold weather. Lime would be a valuable ingredient, as it would neutralize the acid of the tar. If more convenient, a ready prepared roofing tar like that of the Warren Chemical Co. may be used. When the tar is ready, a strip of roof is covered and a line of slates bedded in it very much as tiling would be laid, but having from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch between their edges. In this way each slate has its full surface exposed to the weather. When the whole roof has been laid, all the seams or joints are payed with the tar. The slates are laid so as to break joints like bricks in a wall, the horizontal lines, or those running across the slope of the roof, being continuous. In this method of construction the slate forms the wearing and weather surface, protecting the tar bedding, while the thickness of the tar at the joints and the small quantity exposed to the weather make it apparently as durable as could be wished. The roof of which mention has been made has been on for several years, and is as sound and perfect as when first laid. It has during this time needed no repairs, and bids fair to last for many years longer as sound as when first laid. Apparently, there is no reason why such roof should not last as long as plain slate. They bear walking over without damage, and if from any cause a slate is broken or cracked it can be easily repaired. Cracking of the slate does not always cause a leakage. This style of roof will probably not take the place of all other kinds of roofing material, but it will no doubt be a very valuable addition to the different methods of roof covering, since it gives a flat roof with the generally desirable characteristics of slate.

RAILWAY MONOPOLY.

The cry of railway monopoly and extortion does not resound through the land quite as vigorously as it did three or four years ago, nor are the legislative Solons as eager as they once were to regulate charges and protect the public against unjust discriminations. Yet in one sense there is as much monopoly as ever. So far as the inland carrying trade is concerned, the railways monopolize the whole of it, very much in the same way that two or three rival hotels monopolize the traveling custom in a rural village where there is barely enough of such custom for one hotel. Grain rates to the seaboard touched bottom apparently a good while ago, and as to passenger rates, the bottom seems to be dropping out, so to speak, on some of the great lines, and the rates along with it. There has been during the year a general decline in traffic and earnings, with no very flattering prospect of immediate reaction. In the meantime, some 3,800 miles of new construction have been added, including a few parallel lines, which in the light of past experience were not very much needed.

A few years ago, the shriekers against railway monopoly, saw "one of the greatest problems of the age" looming up in the near future. Three great railway magnates, it was said, controlled upwards of 18,000 miles of road, and could form a frightful combination to oppress the trade and business of the country whenever they chose, by refusing to carry freights at fair and reasonable rates. The alarm of the anti-monopolists has proved to be groundless. One of this formidable trio is dead, and although the survivors may be as rich and powerful as ever, they are evidently not adding to their wealth just now in the way that was apprehended. Railway corporations are common carriers. As such, they are the subjects of law, and cannot get much beyond their legitimate sphere without endangering their own existence. Nor are they exempt from that spirit of competition and rivalry which is an element in all channels of business. In order to keep out of (or get into?) the hands of receivers, they have to battle fiercely among themselves to pay running expenses and save a profit on the investment. Instead of being monopolies in the sense of controlling transportation and dictating rates, the tendency nowadays is quite the reverse of this. Yet in view of the precarious condition, financially, of a large proportion of the railway enterprises projected in recent years, it is an encouraging circumstance that so small a number comparatively have been forced into actual bankruptcy during the present period of depression.

CAR WINDOWS.

There has been some complaint of late about the small size of car windows, both on street and steam roads. The windows of the East River Bridge cars are more particularly objected to on this account, for the reason that people who cross in the cars desire to get as unobstructed a view as possible of the scenery up and down the river. During the hours of heavy traffic, morning and evening, many of the passengers have to stand up, and cannot get a fair look at things outside without stooping. The street cars in Philadelphia have small windows, and many of these have ground glass at the top. On steam roads, the old, small-sized windows are going out of fashion, and even the larger windows of cars that have been constructed more recently are none too large to suit the great majority of people.

Some car-builders have tried to remedy the evil by putting in glass of a very large size, the advantage of which is not fully secured, in consequence of the double blinds with a short lift, which are so generally used. These blinds restrict the view to that portion of the glass that remains uncovered, and the peculiar discomforts incident to large sizes of glass are retained; that is to say, leakage of air and radiation, the latter being so great with large glass as to create the impression that the window is not tight. In cold climates, a double sash is indispensable for large windows, for without it the discomforts arising from increase of size would more than offset the benefits.

Curtains are much to be preferred to slat blinds; not the old style of curtain, swinging loosely at the bottom and flying up to the top of the window, but one with a rod at the bottom of it, with a head to keep it from flying about. The material that is now most used for curtains is a kind of cloth called raw silk; but it has several disadvantages. The right kind of material should evidently be leather, or something that will keep smooth on both sides and not collect dust; or, to go a step further, something that a passenger cannot pull down to the level of his own eyes, regardless of other people who want to see out. It is manifest that no device of invention can remedy this state of things, or change the quality of pork on the hoof when it stands on two legs.

HOME-MADE AND CONTRACT CARS.

The extract we published in our last issue from Mr. Akerman's article in a recent number of the *North American Review*, in which he questions the expediency of railway companies building their own rolling stock, has brought out some opposite views from a correspondent, whose communication will be found on another page. The subject is one upon which a great deal may be said on both sides with equal force and plausibility, the vital point being a correct analysis of all the elements of cost which enter into contract and home construction respectively, so a balance can be struck between them. What our correspondent says has reference to cars exclusively, and is suggested by his own experience in the building of cars in road shops, and his opportunities of comparing such cars with those made at contract shops in the matter of service and repairs. He avers that the cars built by the road with which he is connected (presumably passenger cars) not only last longer, but that the cost of construction is less than the first cost of contract cars, every possible item of cost being included in the estimate. The facts may be, and doubtless are, just as he represents; yet they may be quite exceptional, and no fair criterion by which to form a judgment as to the main issue. Nothing short of detailed specifications and honest and thorough inspection of materials and workmanship, and a statement of every item of cost, will suffice to determine the question of economy as to construction alone, aside from service and repairs.

The prejudice against contract work is largely due to competitive bidding. Rivalry has its destructive as well as constructive side, and road managers are perfectly well aware of this when they solicit bids. Whether the contract price is fixed by reckless underbidding or otherwise it is the price that the builder gets for his work. If the cars are not up to the home-made standard, and if numerous little cheapening processes are introduced here and there by the shrewd and experienced contract man, to save a profit on a desperately low bid, the fault is obviously with the road managers who drive hard bargains, and at the same time are not over-particular about the inspection of the material before it goes into the structure. No contract builder is so ambitious of acquiring a bad reputation in his business as to build cars that will prematurely drop to pieces like a lot of glued furniture. But in awarding contracts, the lowest bidder among a large number of competitors, may be forced to the alternative of shutting up shop or putting in a lower bid than a well-constructed car of given specifications can be built for. It is not surprising, then, under the circumstances, that there should be some sheddy work, but not including wheels, axles and springs, which are usually guaranteed to perform a certain amount of service.

With respect to cost, there is no reason that we can see why a well-arranged, well-equipped, and well-managed contract shop can not turn out cars of the same identical construction at less cost than they can be built for at a first-class road shop. It certainly can be done, but if the general impression about it is not a mistaken one, it is not done. As for the statement of our correspondent, that his twelve-year old home-made cars, which he says are now about as good as new, were built at a less cost than the eight-year old contract cars were built for, and so poorly built at that as to need partial reconstruction, we can only say that there was evidently first-rate management in one shop and miserably poor management in the other, or else the underbidding was so slight as to give the contract concern the advantage of much higher prices than it was fairly entitled to.

THE STRUCTURE OF COAL.

An English geologist, Mr. E. Wethered, has been making microscopic examinations of both English and American coals, and has come to some very interesting and scientific conclusions. Most of these conclusions are of interest to geologists rather than to practical men who use coal. One result seems to have been gained by his researches which will be of general value. He says his investigations into the microscopic structure of coal will enable an expert to judge of the nature of any kind of coal by an inspection made with a pocket lens. This will be a practical application of science to every-day work, and it only remains for the gentleman to publish his observations and show how they are to be utilized.

In this country Dr. Dudley's researches on the structure of wood, and his application of micro-photography to the recording of his observations, will probably be of the greatest value in construction, as the knowledge which he has gained will enable the character of timber to be determined in advance without subjecting it to tests which would injure it. It is possible, even with an ordinary pocket magnifying glass, to recognize the different qualities of timber, and to do it with certainty even when to the unaided eye there is no difference. To do this does not call for a long study of the different kinds of wood under the microscope, which would take a long time and necessitate much labor and no small expense. It may be done by a careful study of a set of the doctor's photographs. Some years since we had occasion to make a report upon the failure of a bridge built of pine timber. Microscopic sections were made of the wood which failed, as well as of other timber, the quality of which was unquestioned. All of these we photographed on a large scale, when the characteristics of both were made very plain. The differences were so marked that even an inexperienced person after studying the photographs, could recognize the characteristic features of the different kinds with a small but powerful magnifying glass. This was a fine illustration of the value which properly directed microscopical researches may have for the practical man who may have neither the time, inclination, nor skill to carry them on.

THE Western Railway Association, which watches out for the patent interests of the railways, has elected the following officers for the ensuing year: President, B. F. Ayer; General Counsel and Treasurer, George Payson; Secretary, C. R. Babeuf; Directors, B. F. Ayer, Illinois Central; B. C. Cook, Northwestern; A. L. Osborn, Michigan Central; H. B. Stone, Burlington; J. C. McMullin, Alton; F. A. Nims, Chicago & West Michigan; C. W. Rogers, St. Louis & San Francisco; Roswell Miller, Milwaukee & St. Paul; J. T. Odell, Northern Pacific; J. C. Newell, Lake Shore; J. C. Brown, Gould's Southwestern system of railroads; T. F. Withrow, Rock Island; Executive Committee, B. F. Ayer, B. C. Cook, A. L. Osborn, John Newell, H. B. Stone, J. T. Odell and F. A. Nims.

The Ironmonger is the name of an attractive new monthly journal, of which we have received the first, or January issue. It is devoted to the hardware and stove industries, and contains numerous illustrations of decorative work, besides a number of humorous sketches, the import of which is apparent from a perusal of the piquant and lively reading matter. It is handsomely printed and well worth the price of subscription, which is one dollar a year. F. B. Da Barard, of Chicago, and Tho. A. Kennett, of New York, Editors. Publication offices, 419 Broadway, New York, and 150 Dearborn street, Chicago.

AN IMPROVED CAR-WHEEL CHUCK.

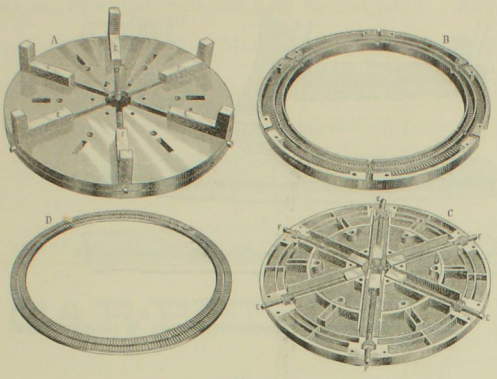


Fig. 1.

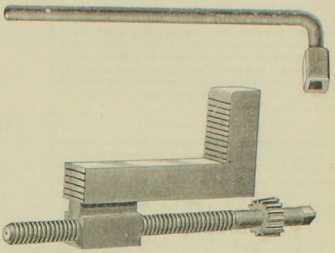


Fig. 2.

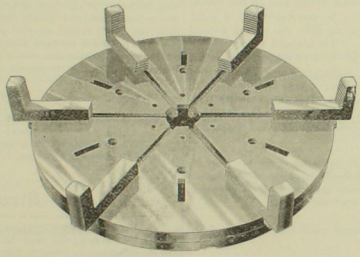


Fig. 3.

The accompanying illustrations show a new car-wheel chuck which has just been brought out by the E. Horton & Son Co., of Windsor Locks, Conn. The improvement, for which patents are pending, was made by Mr. E. B. Bailey, the manager of the company. The principles of construction are the same as those of the other chucks made by the company, but the new one has six jaws which are arranged in two sets, each set being universal and having gears, pinions and driving screws as in a three jawed chuck. Fig. 3 and also *A* in Fig. 1 show the face of the chuck, the former having the jaws run out to their fullest extent, ready to take a 42-inch wheel. In fig. 1, *B* shows the ring or backplate, with the racks for operating. This ring carries the racks in a deep recess and, when bolted in place, forms a tight joint, protecting the gears from dirt and chips. At *C*, Fig. 1, the back of the chuck is shown with the pinion-driving screws and the nuts through which the driving-screws pass. The seat for the lathe face-plate, which is shown in this figure, is 24 inches in diameter and has 12 bolt holes, which gives a very strong and firm hold for the chuck. The racks, shown in Fig. 1 at *D*, are of steel, carefully cut. Two are needed for working the two sets of universal jaws when they are independent of each other. The jaws, lettered *E E E*, are moved by the screws lettered in the same way, while the screws *F* move the jaws *F*. In Fig. 2, the jaw, screw and pinion are shown on a larger scale, together with the wrench which is sent with the chuck.

The chuck, as ordered by some roads, is in effect a double three-jawed chuck, with the corresponding advantages of a stronger and more secure hold of the work. This method of connecting the jaw seems to be more generally favored than the other, where all move together. From a careful consideration of the work to be done, and the conditions under which it has to be performed, it might at first seem that the best arrangement would be to make the chuck single and universal, with all of the six jaws acting together. With such an arrangement, however, there would be much difficulty in operating so many pinions with one rack. If made loose enough to work easily, they would be very inaccurate. The best results are obtained by using the two sets of jaws on the work. First, one set is brought up tight enough to grip the wheel and hold it in place, and then the other set is screwed up hard, after which the first set is brought up tight. This will center the wheel as perfectly as though all the jaws were operated by one rack, and hold it with very nearly, if not quite, double the force of a single set. With three jaws, a small local irregularity may throw the wheel very much out of centre, and this is quite likely to happen in the case of old wheels which are to be ground. A jaw striking on a flat spot will occasionally throw the wheel so far out of true, that the chill may be nearly cut through in the grinding. By using a six-jawed chuck this can hardly happen, as the centering is done from six points instead of three, and every irregularity met by the jaws has a correspondingly less influence on the position of the wheel. The wheel would then be more quickly and accurately centered, and the work of grinding would be lessened. Sometimes one set of jaws is made universal and the other independent, in which case one rack is dispensed with. When all are universal, only one rack is used, all the screws being actuated by it. The capacity of the chuck ranges from 42 inches down to 20, when holding by the faces of the jaws. By using the inner ends of the jaws, work can be held from 25 down to 3 inches. The chuck is very strongly made and is capable of holding any kind of heavy work.

There is one point in connection with universal chucks which seems to be very generally misunderstood, and which deserves attention when speaking of them, and that is the very general misuse of them in the hands of the workmen. The wrench which comes with the chuck is supposed not to be long enough to give the required grip, and so a length of gas-pipe is added, and the chuck very likely is condemned because the grip is not improved by this means. It seems to be generally expected by both foremen and men, that a chuck must hold tightly by the application of the wrench to one of the screws, and they are dissatisfied because they can not do this. The trouble is not in the chuck but in the "eternal nature of things." Metals are elastic, and steel and cast-iron are no exceptions to the rule. When a rack has a heavy pressure put upon it, some stretching takes place, and, though the first screw will hold well, the one next to it will be forced into its place with less force, the next to that with still less, and so on till the last one is reached, which has, of course, the least of all. The remedy (too simple to suggest to a thinking man) is to centre with the rack and the get the grip on the work by a successive application of the wrench to each of the screws. The question is, of course, asked, why not make the rack stronger and stiffer? The answer to this is, that the rack is already strong enough to transmit more power than the plates and jaws of the chuck will bear, and more would only make its destruction certain, while it would not diminish the original difficulty to any extent, the elasticity of the metal coming into play in every case.

In addition to this chuck, the company have recently got out designs for several others. Among them are two 5-inch chucks, one with three and one with four jaws. They have added to their last price list a line of three-jaw chucks for the cutting-off lathe, running from 7-inch up to 24. There are also four sizes of 4-jaw chucks for cutting off lathes ranging from 7 to 14-inch.

A New Drawing-Board and Holder.

At the annual meeting of the American Society of Mechanical Engineers, Mr. Theodore Bergner exhibited a new drawing-board, which is in many respects superior to any similar article which has been put upon the market. The plain drawing-board consists of a thin panel of sounding-board stuff, held by a frame at the back. On the face of this board is a thin blade, like that of an ordinary T-square, which, by a very neat arrangement of cords in the frame, can be moved up and down the face of the board parallel to itself. The cord is arranged in a sort of figure 8 fashion, running up and down the ends of the board and crossing in the centre of the back. A pair of clips on each end of the blade enable the position to be varied at will, and the blade set at an angle. No T-square is required, vertical lines being drawn by means of a triangle. These boards are already in use in some drawing offices, but are by no means as well known as they should be. At the meeting of the Society, an improved form of mounting was shown, which far surpasses anything which has ever been suggested before. It consists of a frame, which holds the board in an inclined position in front of the draughtsman. The board is counterbalanced so that it may be raised or lowered to any desired position by a mere touch of the hand. At the bottom of the board there is a rack or drawer for holding the instruments, while a table below, connected with the frame or easel, completes the apparatus. At a board thus mounted a person may sit or stand in a perfectly upright position, not having to lean forward when at work on any part of the largest drawing which may be put on the board. Those who have nearly broken their backs in leaning over large drawings, will appreciate this improvement, which, in addition to making the work easier, makes accurate drawing a comparatively easy matter, since the blade is always parallel with itself and does not shift and spring as the blade of a T-square is always likely to do, especially when work is being done at the further end from the head.

About Handwriting.

If people who write a sprawling, slipshod, illegible hand could realize the misery they inflict upon their fellow-creatures, they would certainly feel some twinges of conscience. A very large proportion of the writing that is done every day in the way of private and business correspondence, contributions to the press, etc., has to be read by people who had nothing to do with the penmanship. If what is illegible, or can only be deciphered by experts, concerned only the writers themselves instead of being a plague to others, it would not matter so much. People who sit in church pews care little about the style of the preacher's manuscript so long as they don't have to read it. The inability to write so it can be read may be a misfortune rather than a fault, but we have our doubts about that. There are a good many who actually cultivate a vicious handwriting as a kind of high-toned accomplishment that is supposed to be unattainable by office clerks, card writers, and such like modest and unaspiring people; but it is a miserable piece of affectation, even if Horace Greeley and Rufus Choate did set them a bad example without knowing it. Real accomplishments are usually acquired only by diligent and painstaking effort; but a careless, slovenly handwriting is one that can be easily acquired by the laziest man alive inside of two hours.

Although a reform in this matter is extremely desirable in a

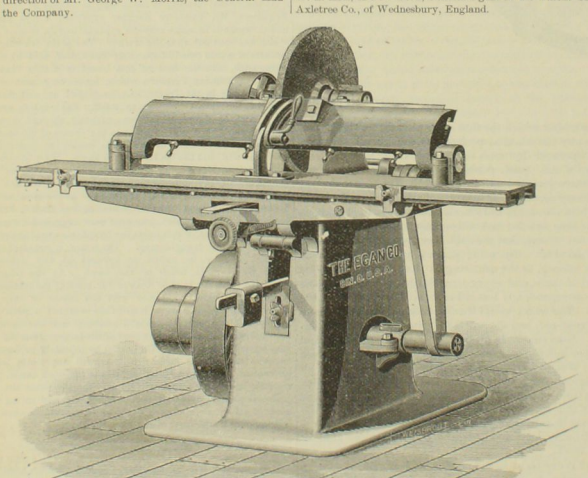
business point of view, it can not be got under way until the subject shall receive more attention in schools and colleges than it now does. The art of writing, so that each letter of every word can be clearly distinguished, the i's dotted and t's crossed, should be an indispensable part of a good education, and any style of penmanship other than this should be put under ban. The old sinners can not, of course, be reformed. The vice is so interwoven into the texture of their being that it can not well be eradicated. Many of them do not know that the names of persons and places should be written plainly, but seem to suppose that an irregular, wavy line, with a wriggle at each end, can be deciphered by referring to the context if in no other way. Such people are a plague to their correspondents, to printers, editors, post-office clerks, and to the world at large, and what we here say about them will probably help them to mend their ways about as little as the burning of a lucifer match would moderate the temperature of Nova Zembla.

THE CUMMER ENGINE CO., of Cleveland, O., has been awarded contracts for one Ballentine Refrigerating Machine for the Heines Brewing Co., East St. Louis, Ill., and a 95 h.-p. engine, with outfit complete, for Lee & Herrick's flour mill, Crookstown, Minn. The company has shipped two refrigerating machines to Joseph Hensler, Newark, N. J.; a 350 h.-p. engine to Carlton, Foster & Co., Oshkosh, Wis.; a 95 h.-p. engine to Edwin Groat, Henderson, N. Y.; and a 130 h.-p. engine to Dominion Wadding Co., Montreal, Can. They report increased sales of the Jonathan Mills Flour Dresser and the Finch Roll.

MR. J. H. RAYMOND, of Chicago, late Secretary of the Western Railroad Association, and M. G. Rainey, late of the St. Louis bar, have formed a law partnership under the name of Raymond & Rainey, with office in the Honoré Buildings, Chicago, Ill. The firm will give attention to applications for patents, and also take charge of general business in the State Courts.

THE EGAN CO., Cincinnati, O., have recently received an order from the Baltimore & Ohio road for a complete outfit of improved wood-working machinery for the shops of the road at Glenwood, Pa., and also for an improved universal wood-working machine for the Mount Clare shops of the same road. The company have other large orders in hand, and report business in their line from fair to middling.

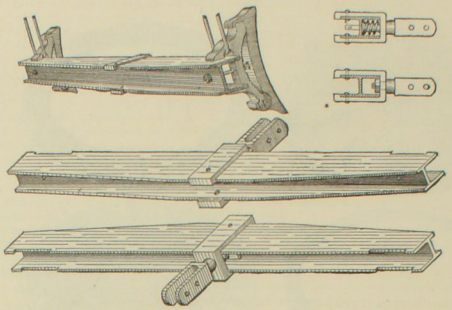
THE A. FRENCH SPRING CO.'S exhibit at New Orleans World's Exposition occupies a space of 20 by 72 feet, and is very interesting and attractive. Around a central pavilion tastefully decorated with the national flag and the Louisiana and Pennsylvania coats of arms, is arranged a full assortment of the various elliptic and spiral springs manufactured by the company, illustrating in a striking manner the perfection that has been attained in the style and quality of these products. There is also a very complete and elaborate view of the company's extensive spring works at Pittsburgh, the whole having been arranged under the direction of Mr. George W. Morris, the General Manager of the Company.



Improved Automatic Knife-Grinding Machine.

(Self-Operating and Stopping.)

This machine (recently introduced by The Egan Co., Cincinnati, O.) is for the grinding of planed knives of any length not exceeding 32 inches, and will be found very serviceable in factories where planers are used, by keeping the knives and cylinders in perfect balance and condition. The grinding is slightly concave, so that the knives can be used much longer without regrinding than if ground straight. The quantity to be ground off, as well as the rate of feed toward the wheel, is readily adjustable. The machine can be set to grind any depth of cut that may be desired, and when the knife has been fastened to the clamps and the wheel set in motion, it requires no further attention. The carriage has a steady traverse movement forward and backward, also a horizontal motion to or from the grinding-wheel, so as to give great wearing accommodation to the wheel, the horizontal movement being adjusted by a hand-wheel and weighted lever shown in front of the machine. The mandrel is of the best cast steel, running in self-oiling boxes, lined with the best Babbitt metal. The emery wheel is of the best make, and specially adapted for the use of this machine. The clamp or jaws which hold the knife on the carriage can be thrown clear back so as to allow a very neat and quick arrangement for setting the knife on the jaws. The frame is cast in one piece, and has a good floor base which does not take up much room, and it is entirely self-contained, as the countershaft and the driving works of the carriage are all on the one frame. The great advantage of making this machine perfectly automatic is to enable the operator of the machine to have one set of knives always ground while the planer is in operation. The loose and tight pulleys are 8 x 3½ in. face, and should make 800 revolutions per minute. Further information may be obtained by addressing the manufacturers, as above.



"Common Sense" Steel Brake-Beam.

The cuts illustrate a light steel brake-beam, weighing about 70 pounds, and designed to take the place of the wooden beams now in use. It requires no change in brake-shoe heads, it being of the same dimensions as the standard wooden beams, and can be converted into a rigid beam, if required, by dispensing with the spring around draw-head or centre clamp. It is claimed that the beam will last the life-time of a car, or even longer, that it has great strength and is also elastic, will prevent sliding of wheels and diminish the amount of wear and damage to same. The top cut represents the beam with Banning's brake-shoe attached. Mr. J. W. Krepps, 11 Pine street, New York, is sole agent for the United States and Canada.

MR. H. A. LITTLE, on Dec. 31, closed his connection with the A. French Spring Co., of Pittsburgh. Mr. Little now represents W. L. Ellis, of New York, General Agent of the Patent Shaft & Axletree Co., of Wednesbury, England.

Tiffany Refrigerator Cars.

BOSTON, Nov. 10, 1884.

WE, the undersigned, directors and stockholders in the Chicago, Boston & Liverpool Co., and engaged in the Produce business in Boston, own and operate 500 Tiffany refrigerator cars, cheerfully testify to their superior qualities for the transportation of all perishable products, both in summer and winter. The company own no other cars, and believe these to be the best. We have no interest in the patents, or in any negotiations concerning the same.

LANSING MILLIS, Gen. Manager.
G. W. SIMPSON,
M. W. BOYNTON } Directors.
BENJ. HINCKLEY,

GEO. W. FISKE, L. W. FOWLER, RICHARD HOLWAY, AMOS KEYES & Co., CORWIN & WILDE, LOWELL BROS. & Co., W. F. ROBINSON & Co.

Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list:

Baltimore & Ohio.—James T. Harahan (late General Manager of the Louisville & Nashville) has been appointed General Superintendent of the Pittsburgh Division.

Burlington & Northwestern and Burlington & Western.—E. S. Edgar is now Superintendent of these roads, and W. B. Jones is Assistant Superintendent.

Central Vermont.—James M. Foss has been appointed General Superintendent. Wm. J. Robertson succeeds Mr. Foss as Superintendent of Motive Power.

Cincinnati, Wheeling & New York.—E. C. Winstanley has been appointed General Manager.

Delaware, Lackawanna & Western.—F. B. Griffith, heretofore General Foreman of Motive Power on the Buffalo Division, has been appointed Master Mechanic of this division, with office at East Buffalo.

East Tennessee, Virginia & Georgia.—The Atlanta and Brunswick Divisions have been consolidated, and will be known as the Georgia Division, with J. W. Fry as Superintendent.

Elkton & Guthrie.—This road was opened for business Feb. 1, and will be operated by the Louisville & Nashville. James Geddes has been appointed Superintendent, with office at Nashville.

Humeston & Shenandoah.—Chas. H. Warren, Superintendent, died at his home in Clarinda, Ia., Dec. 21.

Louisville & Nashville.—Reuben Wells (late Supt. of Machinery), has been appointed General Manager, vice Jas. T. Harahan, resigned.

Marquette, Houghton & Ontonagon.—W. A. Thompson, Master Mechanic, has been appointed Assistant Superintendent. W. A. Mahan succeeds Mr. Thompson as Master Mechanic.

Mobile & Ohio.—J. G. Motley has been appointed General Superintendent and Acting Superintendent of Southern Division.

New Orleans & Northeastern.—Edmund L. Tyler has been appointed Superintendent, with headquarters at New Orleans.

North Pacific Coast.—David Nye, who has been for many years Superintendent of this road, died in San Francisco, Dec. 29.

Old Colony.—A. W. Twombly has been appointed Master Mechanic of Northern Division, vice F. M. Twombly, who has been appointed Master Mechanic of Main Line and Cape Cod Divisions, vice C. Berkley Powell, resigned.

Union Pacific.—R. Blickensderfer has been appointed Superintendent of the Idaho Division.

Wabash, St Louis & Pacific.—C. W. Hollister, with the title of General Foreman, succeeds J. McCarthy, Master Mechanic, on the Rantoul Division.

Worcester & Shrewsbury.—J. F. Bigelow has been appointed Superintendent in place of J. J. Coburn, resigned.

Employment.

WANTED.—By a man who can give first-class references as to character, experience and ability, a position as Engineer, either for locomotive or stationary engines. Address "Beach," office of NATIONAL CAR-BUILDER.

WANTED.—A position as Master Car-Builder, by a man who has had twenty years' experience in the management of car shops on leading roads, and is familiar with the construction of the various kinds of freight and passenger cars. Can give the best references Address "Clermont," office of NATIONAL CAR-BUILDER.

How natural it is to try to get *something* for *nothing*, and expect satisfaction in the use of materials that look well but have no real merit. This is exemplified in painting cars as much as anywhere. The Perfect Method Paints manufactured by us insure durability and saving of time otherwise lost in repainting, or loss by decay of the wood and rust of the iron when the paint has perished, as most of the ordinary paint soon does.

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This book is twice as large as the original edition, and contains 2,188 engravings, including exact engravings of American Cars of every description, and of the different kind of Trucks, Wheels, Brakes, Couplings, Seats, Lamps, Heaters, and all Car Furnishings in general use, in the minutest detail. All the detail drawings are made to scale, and each engraving is briefly described under the definition of its name. All terms in general use in car-building are defined. This is the most elegant, as well as the most valuable, book on American cars ever published, and forms a volume in character and appearance such as usually sold for $5.00. No one connected in any capacity with car-building can afford to be without a copy for study and reference.

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Our Varnishes excel in durability,

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PRIVACY, LUXURY, COMFORT,
PERFECT VENTILATION.

Run regularly every night between
NEW YORK AND BOSTON (Via Springfield).
Leave New York 10:30 P. M.
" Boston 10:30 P. M.

On the express trains.
These cars also make regular night service between
CHICAGO AND DETROIT, over the "Niagara Falls Short Line" (Wabash and Baltimore & Ohio Ry's.)

TIME TABLE.

Leave Chicago 8:45 P. M. Arrive Detroit 6:00 A. M.
" Detroit 9:40 " " Chicago 8:38 "
Between CHICAGO AND ST. LOUIS, over the W., St. L. & P. Ry.
Leave Chicago daily 9:05 P. M. Arrive St. Louis 8:00 A. M.
" St. Louis " 8:00 " " Chicago 7:25 "
And between ST. LOUIS AND KANSAS CITY, over the W., St. L. & P. Ry.
Leave St. Louis daily 8:25 P. M. Arrive Kansas City 8:20 A. M.
" Kansas City " 7:20 " " St. Louis 7:00 "

Mann's Boudoir Car Co. is now prepared to negotiate with railroad companies for placing its cars in regular service on their roads.

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The cars "Adelina Patti" and "Elsika Gerster," undoubtedly the most magnificent private cars in the world, are TO LET for long or short trips. They are provided with attendants, silver, table and bed linen complete. For further particulars and explanatory books apply to

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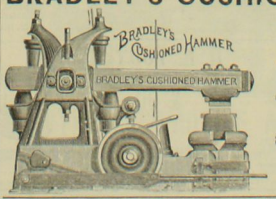

STANDS TO-DAY
WITHOUT AN EQUAL.
OVER 800 IN USE.

It approaches nearer the action of the smith's arm than any hammer in the world.

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(Established 1832.)

Heating Forges for Hard Coal or Coke.

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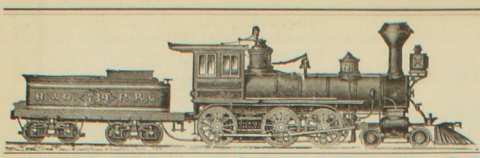

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From standard designs, or according to specifications, to suit purchasers.

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FOR ALL GAUGES.

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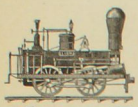
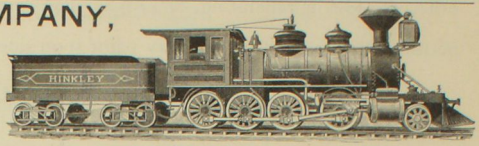


LION, 10 TONS, HINKLEY, 1839. GREELY S. CURTIS, Treas. FRANKLIN D. CHILD, Supt.



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ESTABLISHED 1831.

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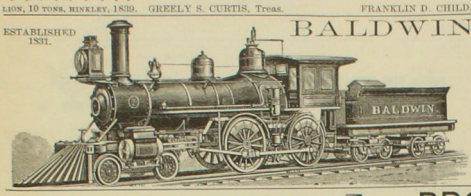

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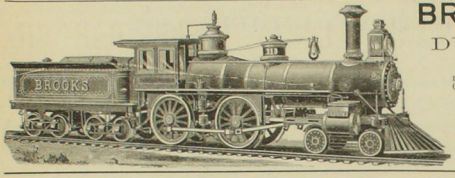

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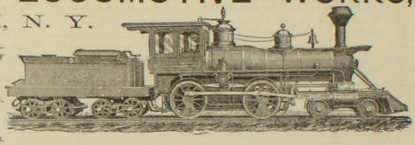

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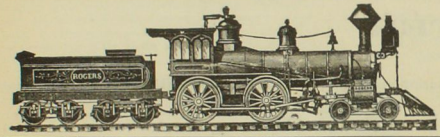

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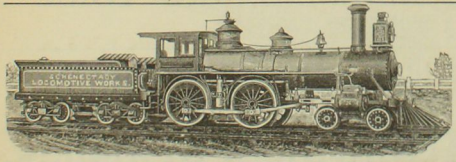

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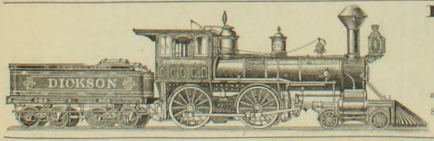
SCHENECTADY, N. Y.



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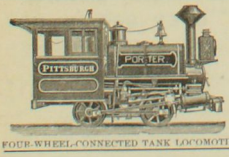

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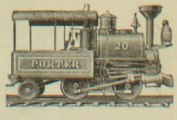

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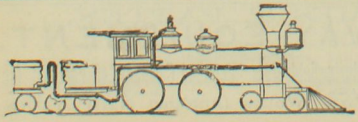

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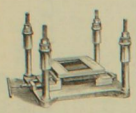
PATENT PORTABLE

VALVE CHUCK.



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Which causes so many Boiler Explosions.

A BOOK ON CARE AND MANAGEMENT OF BOILERS FREE.

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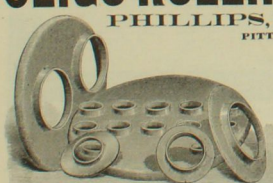

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Quality our Specialty.

BOILER HEADS AND FLUE HOLES FLANGED TO ORDER.

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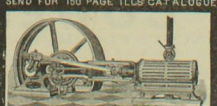

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PATENT PLANISHED SHEET IRON.

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IMPORTED RUSSIA IRON,

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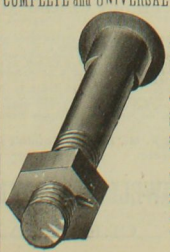

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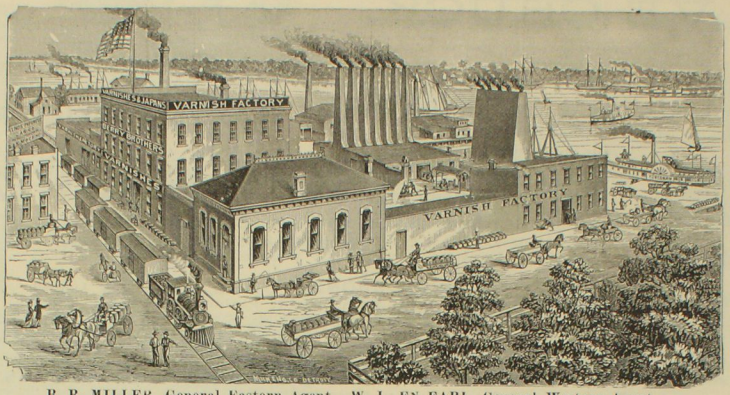

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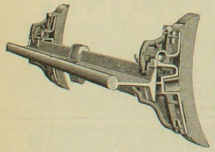

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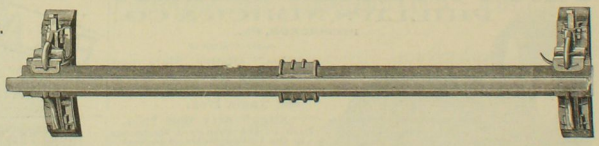
To Fit any Shoe.
Security.
Durability.
Economy.



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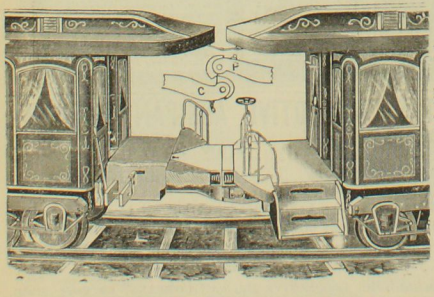
Is the only device forming A CONTINUOUS FLOOR between cars in motion, and PREVENTING JERKING in starting and stopping trains.



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Is an Improvement on the Miller and Works with it.

"Entire Satisfaction"—"Perfect Satisfaction" are the words used by R. F. Smith, Gen'l Manager Cleveland & Pittsburgh R. R.; Hiram Fowler, Supt. Connecticut Valley R. R.; J. W. Thomas, Gen'l Supt. Nashville, Chattanooga & St. Louis Ry.; J. G. Sawyer, Master Car Builder same road, and many others.
"The most practical and perfect device in use"—S. L. Bell, an old Conductor Western & Atlantic R. R.; G. R. Carr, Gen'l Sup't Columbus, Hocking Valley & Toledo R. R.; J. W. Babcock, for years conductor N. Y., Pa. & Ohio Ry.; Gen P. Pease, of Ohio Central Railway.
"Saving much annoyance to passengers"—Chas. B. Couch, Div. Sup't Lake Shore & M. S. Ry., and others.
"A great improvement over any other device I have seen"—J. H. Tinney, Sup't N. Y. & Greenwood Lake Railway.
"It prevents jerking in starting and stopping trains," say Messrs. Babcock, Bell, Couch, Thomas Tinney and others.
"A great saving to railroads," say Messrs. Smith, Thomas Tinney, Fowler, Bell, Babcock, and others.

Refer to the Flint & P. M., Mann's Boudoir Car Co., Cin. Southern, C., N. O. & T. Pacific, W. & A., etc., etc.

THE COWELL PLATFORM & COUPLING CO.,

CLEVELAND, O.

DIRECTORY

to the Railroads of the United States and Canada, showing the gauge, length of road, number of motives and number of cars; and giving the names and titles of their officers in charge of the operating, purchasing and rolling stock departments.

A

Adirondack R. R. 4-8½ gauge 60 m. 3 lo. 62 cars.
C. E. Durkee, *Supt.* ..... Saratoga, N. Y.
Jacob Myers, *M. M.* ..... Saratoga, N. Y.
Jas. J. Traver, *M. C. R.* ..... Saratoga, N. Y.
Addison & Northern Penn R. Ry. 3 g. 51 m. 5 lo. 50 c.
F. M. Baker, *Gen. Supt.* ..... Addison, N. Y.
Alabama Great So'n R. R. (*See Cin., N. O. & T. R.*)
Albany & Susquehanna R. R. (*See D. & H. Canal Co.*)
Albemarle & Raleigh R. R. 4-8½ g. 33 m. 3 lo. 35 c.
Jas. H. Petty, *Gen. Supt.* ..... Tarboro, N. C.
Albert Ry. 4-8½ g. 51 m. 3 lo. 35 cars.
G. A. Robinson, *Man. Pur. Agt.* Hillsboro, N. B.
Jas. McKay, *M. M. & C. R.* ..... Hillsboro, N. B.
Alexandria & Fredericksburg Ry. (*See Penna. R. R.*)
Alexandria & Washington R. R. (*See Penna. R. R.*)
Allegheny Valley R. R. 4-9 g. 250 m. 7 lo. 2,202 c.
David McCargo, *Gen. Supt. & Pur. Agt.* ..... and
C. B. Price, *Supt.* (Riv. Div.) ..... Pittsburg, Pa.
A. A. Jackson, *Supt.* (L. O. Div.) ..... Reynoldsville, Pa.
W. A. Wood, *M. M.* ..... Verona, Pa.
R. Gunning, *M. C. R.* ..... Verona, Pa.
Alliance, Niles & Ashtabula R. R. (*See Penna. R. R. Co.*)
Annapolis & Elk Ridge R. R. 4-8½ g. 20 m. 4 lo. 29 c.
W. H. Baous, *Supt. & Pur. Agt.* ..... Annapolis, Md.
John L. Beall, *M. Mach.* ..... Annapolis, Md.
Anniston & Atlantic R. R. 3 g. 9 m.
Thos. K. Scott, *Supt.* ..... Anniston, Ala.
Antwerp & Paulding R. R. 4-8½ g. 6 m. 4 lo. 63 c.
E. C. Mann, *Gen. Man.* ..... Antwerp, O.
William Fitzsimmons, *Jr., Pur. Agt.* Antwerp, O.
Arizona & New Mexico Ry. 3 g. 71 m. 3 lo. 60 cars.
W. H. Jones, *Gen. Supt. & P. A.* Harrisburg, N. M.
W. C. Boylan, *M. M. & M. B.* Lordsburg, N. M.
Arkansas Midland R. R. 3-0 g. 63 m. 4 lo. 45 cars.
A. H. Johnson, *Pr. & Gen. Man.* ..... Helena, Ark.
J. B. Johnson, *M. M. & M. C. R.* ..... Helena, Ark.
Arkansas & Louisiana Ry. 4-8½ g. 28 m.
J. D. Beardsley, *Supt.* ..... Washington, Ark.
Asheville & Spartanburg R. R. 5 g. 49 m. 2 lo. 12 c.
Jas. Anderson, *Supt. & Pur. Agt.* ..... and
M. M. ..... Spartanburg, S. C.
W. B. Brown, *M. C. R.* ..... Spartanburg, S. C.
Ashland Coal & Iron Ry. 4-8½ g. 10 m. 1 lo. 432 c.
Douglas Putnam, *Jr., Gen. Supt.* Ashland, Ky.
Robt. Peebles, *Pur. Agt.* ..... Ashland, Ky.
E. M. Roberts, *M. M.* ..... Ashland, Ky.
Ashtanula & Pittsburgh R. R. (*See Penna. Co.*)
Atchison, Topeka & Santa Fé R. R.
4-8½ g. 2,020 m. 348 lo. 9,029 cars.
A. A. Robinson, *Gen. Supt.* ..... Topeka, Kan.
Geo. B. Harris, *Asst. Gen. Man.* ..... Topeka, Kan.
Geo. Hackney, *Supt. Mach.* ..... Topeka, Kan.
Clem. Hackney, *Asst. Supt. Mach. Dept.* do.
Geo. Hargraves, *Pur. Agt.* ..... Topeka, Kan.
Eastern Div.: D. J. Chamberlain, *Supt.* ..... Emporia, Kan.
Henry Hull, *G. F. Car Dept.* ..... Topeka, Kan.
John Pagan, *M. M.* ..... Atchison, Kan.
J. M. Smith, *M. M.* ..... Kansas City, Mo.
Alfred Taylor, *M. M.* ..... Emporia, Kan.
Mid. Div.: H. R. Nickerson, *Supt.* ..... Florence, Kan.
W. Y. Johnson, *M. M.* ..... Nickerson, Kan.
W. Div.: C. M. Rathburn, *Supt.* ..... La Junta, Col.
A. C. Stiles, *M. M.* ..... La Junta, Col.
D. H. Dotterer, *M. M.* ..... Raton, N. M.
Las Vegas Div.: Chas. Dyer, *Supt.* Las Vegas, N. M.
F. B. Woodruff, *M. M.* ..... Las Vegas, N. M.
J. H. Holman, *M. M.* ..... Wallace, N. M.
Rio Gr. Div.: T. F. Barr, *Supt. Sou.* ..... El Paso, Tex.
E. Hackett, *M. M.* ..... San Marcial, N. M.
H. P. Dicott, *M. M.* ..... Socorro, N. M.
Geo. A. Hancock, *M. M.* ..... El Paso, Tex.
Sonora Div. ..... 205 m.
W. H. Waugh, *M. M.* ..... Guaymas, Mex.
Kan. Cy., Law. & So. Kan. 4-8½ g. 360 m. 24 lo. 787 c.
J. L. Barnes, *Supt.* ..... Lawrence, Kan.
T. D. Volz, *M. M.* ..... Ottawa, Kan.
Atlanta & West Point R. R. (*See Western of Alabama.*)
Atlantic & Danville Ry. 3 g. 17 m.
E. T. Sweatt, *Gen. Man.* ..... Keysville, Va.
Atlantic & North Carolina R. R. (*See Midland N. C.*)
Atlantic, Tenn. & Ohio R. R. (*See Rich. & Dan.*) (2) Div.)
Atlantic & Pacific R. R. 5'6 g. 575 m.
F. W. Smith, *G. Supt.* ..... Albuquerque, N. M.
F. P. Wherry, *Pur. Agt.* ..... St. Louis, Mo.
Geo. Chalender, *Supt. M. P. & M.*, and
Geo. F. Chalender, *A. Supt.* Albuquerque, N. M.
Augusta & Knoxville R. R. (*See Ga. Pac. Ry.*)
Austin & Northwestern R. R. 3 g. 60 m. 5 lo. 75 c.
J. A. Rhomberg, *Gen. Man.* ..... Austin, Tex.

B

Bachman Valley R. R. (*See Han. June., Han. & Gett.*)
Balt. & Delaware Bay R. R. 4-8½ g. 50 m. 2 lo. 13 c.
Fred Gerker, *Gen. Sup. & P. A.* Chestertown, Md.
Baltimore & Hanover R. R. (*See Penna. R. R. & C.*)
Baltimore & Ohio R. R.
4-8½ g. 1,012 m. 574 lo. 17,339 cars.
B. Dunham, *Gen. Man.* ..... Baltimore, Md.
N. S. Hill, *Pur. Agt.* ..... Baltimore, Md.
Main Stem Div. ..... 378 m.
W. M. Clements, *Gen. Supt.* ..... Baltimore, Md.
A. J. Cromwell, *M. M.* ..... Baltimore, Md.
E. W. Grieves, *M. C. R.* ..... Baltimore, Md.
I. N. Kalbaugh, *M. M.* ..... Baltimore, Md.
Wm. Edwards, *M. M.* ..... Martinsburg, W. Va.
Sam. Houston, *M. M.* ..... Piedmont, W. Va.
Robert Maxwell, *M. M.* ..... Grafton, W. Va.
S. B. Crawford, *M. M.* ..... Grafton, W. Va.
Alex. Laird, *M. M.* ..... Parkersburg, W. Va.
W. B. McClung, *M. M.* ..... Parkersburg, W. Va.
Pitts. Div.: J. T. Harahan, *Gen. Supt.* Pittsburgh, Pa.
J. E. Sampsell, *Pur. Agt.* ..... Connellsville, Pa.
Trans-Ohio Div.: G. J. Forsecre, *G. Supt.* Newark, O.
W. H. Harrison, *M. of Mach.* ..... Newark, O.
E. L. Weigeroth, *M. M.* ..... Newark, O.
H. M. Ingler, *M. M.* ..... Bellaire, O.
O. B. Perkins, *M. M.* ..... Zanesville, O.
Andrew Beckert, *M. M.* ..... Sandusky, O.
F. J. Gunther, *M. M.* ..... Chicago Junction, O.
Chi. Div.: F. H. Britton, *Supt. Trans Terminals.* Chicago, Ill.
Benj. Lowther, *M. M.* ..... Garrett, Ind.
W. H. Wilkinson, *M. M.* ..... Kingston, Ill.
Baltimore & Philadelphia, 4-8½ g. 40 m. 7 lo. 35 c.
B. Dunham, *Gen. Man.* ..... Baltimore, Md.
D. Conrad, *Supt.* ..... Wilmington, Del.
Baltimore & Potomac R. R. (*See Penna. R. R. (7) Div.*)
Bangor & Piscataquis R. R. 4-8½ g. 47 m. 3 lo. 25 cars.
Arthur Brown, *Supt. & Pur. Agt.* Bangor, Me.
C. S. Nason, *M. M.* ..... Bangor, Me.
J. W. Comins, *M. C. R.* ..... Orrington, Me.
Bangor & Portland Ry. 4-8½ g. 25 m. 3 lo. 3 c.
C. Miller, *Pres. & Gen. Man.* ..... Brunswick, Me.
Barclay R. R. 4-8½ g. 16 m. 1 lo. 200 c.
F. F. Lyon, *Sup.* ..... Barclay, Pa.
J. A. Hardenburg, *Pur. Agt.* 321 Cortlandt St.
Wm. Johnson, *M. M.* ..... Towanda, Pa.
Batesville & Brinkley R. R. 3 g. 25 m. 1 lo. 34 c.
R. W. Martin, *Pres.* ..... Little Rock, Ark.
W. J. Thompson, *Gen. Man.* Little Rock, Ark.
E. Summerfield, *Gen. Supt.* ..... Brinkley, Ark.
R. B. Davis, *Pur. Agt.* ..... Brinkley, Ark.
John White, *M. M.* ..... Brinkley, Ark.
Bath & Hammondsport R. R. Allen Wood, *Gen. Man.* Hammondsport, N. Y.
Baton Rouge, Grosse Tete & Opelousas R. R.
5-6 g. 29 m. 3 lo. 12 c.
D. C. Montan, *Gen. Supt.* ..... Fort Allen, La.
Bedford & Bloomfield Ry. 3 g. 43 m. 5 lo. 80 cars.
Jas. W. Kennedy, *Gen. Supt. & Pur. Agt.* and
Supt. John Thumser, *M. M.* ..... Bedford, Ind.
Jas. Richards, *M. C. R.* ..... Bedford, Ind.
Bellaire, Zanesville & Cin. Ry. Co. 3 g. 42 m. 5 lo. 71 c.
S. L. Mooney, *Gen. Supt.* ..... Woodsville, O.
J. B. Hong, *M. M.* ..... Bellaire, O.
Bell's Gap R. R. 4-5 g. 25 m. 5 lo. 148 cars.
R. G. Ford, *Supt. & Pur. Agt.* ..... Bellwood, Pa.
Geo. Van Brunt, *M. M.* ..... Bellwood, Pa.
A. Zimmerman, *M. C. R.* ..... Bellwood, Pa.
Belt R. R. 4-8½ g. 12 m. 10 lo.
W. P. Ijams, *Supt.* ..... Indianapolis, Ind.
Belt Ry. 4-8½ g. 27 m.
Jas. D. Carson, *Gen. Man.* ..... Chicago, Ill.
R. W. Johnson, *M. M.* ..... Chicago, Ill.
Bennington & Glastonbury. 4-8 g. 10 m.
R. C. Rood, *Pres* ..... Bennington, Vt.
Bennington & Rutland Ry. 4-8½ g. 59 m. 10 lo. 236 c.
F. C. White, *Gen. & Pur. Agt.* Bennington, Vt.
G. W. Blanchard, *M. M.* ..... Rutland, Vt.
Berlin Branch R. R. (*See Han. June., Han. & Gett.*)
Bingham, Canyon & Camp Floyd (*See Rio Grande Ry.*)
Bladen, Columbus & Florida. 4-8½ g. 16 m. 1 lo. 2 c.
John Colville, *Pres* ..... Wilmington, N. C.
Bodie & Benton Ry.
Thomas Holt, *Supt. & Pur. Agt.* 3 g. 34 miles.
E. H. Barton, *M. & C. R.* ..... Bodie, Cal.
Boston, Barre & Gardner. 4-8½ g. 37 m. 8 lo. 108 c.
H. D. Marshall, *Supt. & M. M.* Worcester, Mass.
Frank I. Goodwin, *M. M.* ..... Worcester, Mass.
Boston, Hoosac Tunnel & W'n Ry.
4-8½ g. 10 m. 1 lo. 1,038 cars.
H. L. Morrill, *Gen. Man.* Mechanicsville, N. Y.
C. H. Cory, *Pur. Agt.* ..... Mechanicsville, N. Y.
C. H. Cory, *Supt. & M. M.* ..... Mechanicsville, N. Y.
John S. Ellis, *M. C. R.* ..... Mechanicsville, N. Y.
Boston, Revere Beach & Lynn R. R. 3 g. 11 m. 4 lo. 46 c.
C. A. Hammond, *Supt. & P. Agt* Boston, Mass.
H. D. Sutherland, *M. M.* ..... Boston, Mass.
John Coghlan, *M. C. R.* ..... Boston, Mass.
Boston, Winthrop & Point Shirley R. R.
4-8½ g. 10 m. 1 lo. 8 c.
C. A. Parks, *Supt.* ..... Boston, Mass.
J. W. Davis, *M. M.* ..... Winthrop, Mass.
Boston & Albany R. R. 4-8½ g. 372 m. 245 lo. 6,114 c.
W. H. Barnes, *Gen. Man.* ..... Boston, Mass.
Edw. Gallup, *Gen. Supt.* ..... Springfield, Mass.
A. B. Underhill, *Supt. M. P.* ..... Springfield, Mass.
F. D. Adams, *Gen. M. M.* ..... Springfield, Mass.
J. T. Chamberlain, *Fr. C. shop* Allston, Mass.
H. B. Chesley, *Div. Supt.* ..... Boston, Mass.
G. B. Colby, *Div. M. M.* ..... Boston, Mass.
C. E. Grover, *Div. Supt.* ..... Springfield, Mass.
H. W. Edgy, *Div. M. M.* ..... Springfield, Mass.
J. B. Weston, *Fr. Car Sh.* Springfield, Mass.
W. H. Russell, *Jr., Div. Supt.* E. Albany, N. Y.
T. B. Purvis, *Div. M. M.* ..... East Albany, N. Y.
J. E. Doran, *Fr. Car Sh.* ..... East Albany, N. Y.
Boston & Lowell R. R.
4-8½ g. 140 m. 82 lo. 2,565 cars.
C. S. Mellen, *Gen. Supt.* ..... Boston, Mass.
F. H. Vose, *Pur. Agt.* ..... Boston, Mass.
Jas. K. Taylor, *Supt. S. & M.* Concord, N. H.
Div.: J. F. Crockett, *Supt.* ..... Boston, Mass.
E. T. Sumner, *M. M.* ..... Boston, Mass.
No. Div.: Geo. A. Todd, *Supt.* ..... Concord, N. H.
C. C. Aspinwall, *M. M.* ..... Concord, N. H.
Wh. Mount Div.: W. A. Stowell, *Supt.* Concord, N. H.
Geo. A. Hobson, *M.* ..... Lake Village, N. H.
Boston & Maine R. R. 4-8½ g. 491 m. 300 lo. 4,600 c.
J. T. Furber, *Gen. Man.* ..... Boston, Mass.
Geo. J. Parker, *Gen. Supt.* ..... Boston, Mass.
Wm. Smith, *Supt. M. P.* ..... Boston, Mass.
D. C. Richardson, *M. C. R.* ..... Lawrence, Mass.
West. Div.: Jas. Merritt, *Jr., Supt.* Fitchburg, Mass.
East. Div.: D. W. Sanborn, *Supt.* Boston, Mass.
North Div.:
J. W. Sanborn, *Supt.*, Wolfboro June., N. H.
Boston & N. Y. Air Line R. R. (*See N. Y., N. H. & H.*)
Boston & Providence R. R. 4-8½ g. 72 m. 39 lo. 2,000 c.
A. A. Folsom, *Gen. Supt. & P. A.* Boston, Mass
Geo. Richards, *M. M.* ..... Providence, R. I.
Jno. Lichtner, *M. C. R.* ..... Roxbury, Mass.
Bowling Green R. R. 4-8½ g. 6 m. 2 lo. 4 c.
Wm. Dalby, *Supt.* ..... Bowling Green, O.
Wm. A. Wiggins, *Pur. Agt.* ..... Bowling Green, O.
Bradford, Bordell & Kinzua R. R. 3 g. 42 m. 6 lo. 62 c.
Bradford, Eldred & Cuba. 3 g. 54 m. 0 l. 158 c.
Tonawanda Valley & Cuba. 3 g. 60 m. 5 lo. 31 c.
J. V. D. Loomis, *Supt.* ..... Cuba, N. Y.
Jno. Delaney, *M. M. & C. B.* ..... Bradford, Pa.
Brattleboro & Whitehall R. R. 4-8½ g. 36 m. 3 lo. 56 c.
(*Operated by Central Vermont.*)
Brewster & Frankford R. R. (*See Del., Md. & Va.*)
Bridgton & Saco River R. R. 3 g. 18 m. 2 lo. 10 cars.
Wm. F. Perry, *Gen. Supt.* ..... Bridgton, Me.
H. M. Caswell, *M. M. & Pur. Agt.* Bridgton, Me.
Brighthope Ry. 3 g. 37 m. 4 lo. 193 cars.
Jas. R. Worth, *Supt.* ..... Richmond, Va.
F. M. Buckingham, *Pur. Agt.* ..... Richmond, Va.
A. Gary, *Supt. Way & Works* Winterpock, Va.
Rob. Kredell, *M. M.* ..... Chester, Va.
Brooklyn, Bath & Coney Island R. R.
4-8½ g. 7 m. 8 lo. 36 cars.
Geo. A. Gunther, *Gen. Man.* ..... Brooklyn, N. Y.
Aug. Wolff, *M. M.* ..... Brooklyn, N. Y.
Brooklyn, Flatbush & Coney Island Ry.
4-8½ g. 7 m. 7 lo. 54 c.
J. L. Morrow, *Supt. & P. A.* ..... Brooklyn, N. Y.
Wm. Finley, *M. M.* ..... Brooklyn, N. Y.
Brooklyn & Rockaway Beach R. R.
4-8½ g. 3 m. 2 lo. 18 cars.
Wm. Warner, *Supt.* ..... Long Island New York, N. Y.
Brunswick & Western R. R. 5 g. 172 m. 13 lo. 170 c.
H. S. Haines, *Gen. Sup. & P. A.* Brunswick, Ga.
C. R. Will, *Asst. Gen. Man.* ..... Brunswick, Ga.
W. R. Kline, *M. M.* ..... Brunswick, Ga.
Buff., N. Y. & Phila. R. R. 4-8½ g. 455 m. 18 lo. 2,000 c.
Geo. S. Gatchell, *Gen. Supt.* ..... Buffalo, N. Y.
W. W. Halsey, *Asst. to G. Supt.* Buffalo, N. Y.
Allen Vail, *M. M.* ..... Buffalo, N. Y.
Buff. Div.: Henry Dwyer, *Supt.* ..... Buffalo, N. Y.
Roch. Div.: J. R. Watson, *Supt.* ..... Olean, N. Y.
Pitts. Div.: E. H. Witter, *Supt.* ..... Oil City, Pa.
H. G. Kalbaugh, *M. M.* ..... Oil City, Pa.
C. E. Turner, *M. M.* ..... Olean, N. Y.
Burlington, Cedar Rapids & Northern Ry.
4-8½ g. 969 m. 520 lo. 4,000 c.
C. J. Ives, *Pres. & Gen. Supt.* Cedar Rapids, Ia.
Robt. Williams, *Gen. Supt.* ..... Cedar Rapids, Ia.
T. Stickney, *Pur. Agt.* ..... Cedar Rapids, Ia.
R. W. Bushnell, *M. M. & C. B.* Cedar Rapids, Ia.
Burlington & Lamoille R. R. 3 g. 44 m. 4 lo. 64 c.
G. L. Linsley, *Gen. Man. & Supt.* Burlington, Vt.
F. A. Brewster, *M. M.* ..... Burlington, Vt.
Burlington & Mo. Riv. R. R. (In Neb.) 4-8½ g. 61 m.
Burlington & North-west'n Ry. 3 g. 38 m. 3 lo. 97 c.
Burlington & Western R. R. 3 g. 38 m. 2 lo. 38 c.
E. S. Edger, *Supt.* ..... Burlington, Ia.
Burlington & Ohio River R. R. 4-8½ g.
R. Tanner, *Pur. Agt.* ..... Chicago, Ill.

C

California Northern R. R. 4-8½ g. 26 m. 2 lo. 17 c.
Andrew J. Binney, *Gen. Man.* Marysville, Cal.
California Southern R. R. 4-8½ g. 127 m. 13 lo. 301 c.
H. N. Victor, *Supt.* ..... National City, Cal.
H. M. Keith, *M. M.* ..... National City, Cal.
Cambridge & Seaford. (*See Penna. R. R. (7) Div.*)
Camden Atlantic R. R. (*See Penna. R. R. (2) Div.*)
Canada Atlantic Ry. 4-8½ g. 47 lo. 6 cars.
D. C. Linsley, *Man.* ..... Ottawa, Ont.
M. Donahoe, *Asst. Sup.* ..... Ottawa, Ont.
Canadian Pacific R. R. 4-8½ g. 1,742 m. 1181 lo. 2,000 c.
W. C. Van Horne, *Gen. Man.* ..... Montreal, Can.
Francis H. Brown, *Mech. Engr.* ..... Montreal, Can.
T. G. Shaughnessy, *Pur. Agt.* ..... Montreal, Can.
E. Div.: Archer Baker, *Gen. Supt.* Montreal, Can.
W. Div.: J. M. Egan, *Gen. Supt.* ..... Winnipeg, Man.
Ontario Div.: Wm. White, *Gen. Supt.* Montreal, Can.
Cape P. & Yadkin Val. R. R. 4-8½ g. 112 m. 5 lo. 100 c.
J. S. Morrison, *Gen. Supt.* ..... Fayetteville, N. C.
Isaac W. Clark, *M. M. & C. B.* ..... Fayetteville, N. C.
Cape Girardeau Southwestern Ry.
4-8½ g. 33 m. 3 lo. 20 cars.
Louis Houck, *Gen. Man.* ..... Cape Girardeau, Mo.
W. A. Penney, *Gen. Supt.* Cape Girardeau, Mo.
W. H. Wheler, *Pur. Agt.* Cape Girardeau, Mo.
Fred Glover, *M. M.* ..... Cape Girardeau, Mo.
Carolina Central R. R. (*See Rd. & Aug.*)
Carrilon & Grenville Ry. 5-6 g. 13 m.
R. W. Sheuard, *Pres.* ..... Montreal, Can.
Carson & Colorado R. R. (*See Virginia & Truckee.*)
Catasauqua & Fogelsville. 4-8½ g. 25 m. 6 lo. 581 c.
C. W. Chapman, *Supt. & P. A.* Catasauqua, Pa.
J. Thomas, *M. M.* ..... Hokendaqua, Pa.
Chas. J. Hollbach, *M. C. R.* ..... Catasauqua, Pa.
Catskill Mountain R. R. 3 g. 16 m. 3 lo. 96 cars.
Charles A. Beach, *Supt.* ..... Catskill, N. Y.
Cazenovia, Canastota & De Ruyter. (*See U., I. & E.*)
Central and South-western Railroads (Ga.).
5 g. 1,115 m. 145 lo. 2,008 cars.
W. G. Raoul, *Pres* ..... Savannah, Ga.
Wm. Rogers, *Gen. Supt.* ..... Savannah, Ga.
C. H. Dutson, *Pur. Agt.* ..... Savannah, Ga.
Cen. Div.: O. D. Anne, *M. M.* ..... Savannah, Ga.
T. F. Warwick, *M. M.* ..... Augusta, Ga.
Jno. Bowden, *M. C. R.* ..... Savannah, Ga.
So.-West'n Div.: T. D. Kline, *Supt.* ..... Macon, Ga.
F. M. Nugent, *M. M.* ..... Macon, Ga.
James A. Knight, *M. C. R.* ..... Macon, Ga.
Central R. R. of N. J. (*See Phil. & Read.; N. J. Cen. Div.*)
Central R. R. of S. C. (*See W. & W.*)
Central American & Pacific Ry. 3 g. 67 m. 3 lo. 11 c.
W. P. Simmons, *Gen. Supt.* Escuintla, Guat.
Central Branch Union Pacific R. R. 3 g. 296 m. 1,290 c.
Central Iowa Ry. 4-8½ g. 412 m. 50 lo. 2,313 cars.
E. L. Dudley, *Supt.* ..... Marshalltown, Ia.
J. G. Johnston, *Asst. Supt.* Marshalltown, Ia.
D. D. Paige, *Asst. Supt.* ..... Monmouth, Ill.
C. H. Ackert, *Asst. Pur. Agt.* Marshalltown, Ia.
John Player, *M. M. & M. C. R.* Marshalltown, Ia.
Central Ohio Ry. 4-8½ g. 33 m. 4 lo. 69 cars.
J. B. McMullen, *Gen. Man.* ..... Picton, Ont.
James Hartzman, *M. M.* ..... Trenton, Ont.
Central Pac. R. R. 4-8½ g. 4,303 m. 3851 lo. 12,590 c.
A. N. Towne, *Gen. Man.* ..... San Francisco, Cal.
E. H. Miller, *Asst. Gen. Man.* San Francisco, Cal.
R. H. Pratt, *A. G. Supt.* ..... San Francisco, Cal.
A. J. Stevens, *Gen. Pur. Agt.* Sacramento, Cal.
W. McKenzie, *Asst. G. M. M.* Sacramento, Cal.
Benj. Welch, *Gen. Sup. M. P.* ..... Sacramento, Cal.
G. J. Turner, *Asst. G. M. C. B.* Sacramento, Cal.
Western Div.: Oakland & Tulare Divs. and Northern Ry.
A. D. Wilder, *Supt.* ..... Oakland, Cal.
G. D. Welch, *M. M.* (W. Div.) W. Oakland, Cal.
W. B. Leonard, *M. M.* (W. Div.) ..... Reno, Nev.
S. Johnson, *M. M.* (T. Div.) ..... Tulare, Cal.
D. Butterfield, *M. M.* (N. Rd.) S. Vallejo, Cal.
Sacramento, Oregon Divs.; and Cal. Pac. R. R.
J. B. Wright, *Supt.* ..... Sacramento, Cal.
M. W. Coler, *M. M.* (S. Div. Sacramento, Cal.
Truckee Div.: J. H. Whited, *Supt.* Wadsworth, Nev.
Geo. Gregg, *M. M.* ..... Wadsworth, Nev.
Wm. McPherson, *F. Car Sh.* Wadsworth, Nev.
Humb't Div.: G. W. Coddington, *Supt.* Carlin, Nev.
W. F. Bailey, *M. M.* ..... Carlin, Nev.
J. C. Doughty, *For. Car Sh.* ..... Carlin, Nev.
Salt Lake Valley: A. G. Fell, *Supt.* ..... Ogden, Utah.
James Lamb, *M. M.* ..... Ogden, Utah.
A. Sherburne, *For. Car Sh.* ..... Ogden, Utah.
Colorado Div.: E. Bewley, *Supt.* ..... Uvalde, Col.
St. & Cop. R. R.: R. L. Myrick, *Supt.* Stockton, Cal.
Los Angeles and Yuma Divs. (So. Pac.):
E. E. Hewitt, *Asst. Supt.* ..... Los Angeles, Cal.
James Velsir, *M. M.* ..... Los Angeles, Cal.
T. F. Shaffer, *For. Car Sh.* Los Angeles, Cal.
Arizona Divs. (So. Pac.):
J. A. Blair, *Asst. Supt.* ..... Tucson, Ariz.
W. F. Smith, *M. M.* ..... El Paso, Tex.
Rio Grande (S. Pac.) & El Paso (G. H. & S. A.) Divs.:
C. B. Seymour, *Supt.* ..... El Paso, Texas.
J. L. Bonner, *M. M.* ..... El Paso, Texas.
H. C. Standish, *For. Sh.* ..... El Paso, Texas.
Galveston, Harrisburg & Houston Divs. (So. Pac.):
E. G. Thompson, *Supt.* ..... Houston, Tex.
San Anto. Div.: A. Van Vleck, *Supt.* and
J. J. Ryan, *M. M.* ..... San Antonio, Tex.
D. T. Davis, *Supt. Car Shops* Harrisburg, Tex.
Louisiana Div.: W. Irvin, *Supt.* ..... Houston, Tex.
D. C. Smith, *M. M.* ..... Houston, Tex.
El Paso Div.: E. B. Seymour, *Supt.* El Paso, Tex.
J. L. Bonner, *M. M.* ..... El Paso, Tex.
Central Texas & N'w'n R. R. (*See Hous. & Tex. Cen.*)
Central Vermont R. R. 4-8½ g. 804 m. 450 lo. 7,780 c.
J. W. Hobart, *Gen. Man.* ..... St. Albans, Vt.
J. M. Wood, *Supt.* ..... St. Albans, Vt.
W. J. Robertson, *Supt. M. P.* ..... St. Albans, Vt.
No. Div.: J. B. Futvoye, *Supt.* ..... St. Johns, P. Q.
Rut. Div.: W. Irwin, *Supt.* ..... Rutland, Vt.
N. L. Davis, *M. M. & C. B.* ..... Rutland, Vt.
Brattleboro & Whitehall R. R., and
Brat. Div.: E. F. Brooks, *Supt.* Brattleboro, Vt.
New London N'n'n R. R. 143 m. 22 lo. 303 c.
C. F. Spaulding, *Supt. & P. A.* New London, Ct.
A. J. Robertson, *M. M.* ..... New London, Ct.
Chagrin Falls & Cleveland R. R. New London, Ct.
Chagrin Falls & Southern R. R. 3 g. 9 m. 1 lo. 12 c.
W. Hutchings, *Gen. Man.* ..... Chagrin Falls, O.
J. W. Wilson, *Supt.* ..... Chagrin Falls, O.
Charleston & Savannah Ry. 5 g. 115 m. 15 lo. 200 c.
H. S. Haines, *Gen. Man.* ..... Savannah, Ga.
C. S. Gadsden, *Pres.* ..... Charleston, S. C.
H. A. Ulmo, *M. M.* ..... Savannah, Ga.
Charlotte, Columbia & Augusta R. R. 4-8½ g. 247 m. 10 lo. 1,000 c.
Chateaugay R. R. 3 g. 34 m. 8 lo. 380 cars.
A. L. Inman, *Gen. Man.* ..... Plattsburg, N. Y.
A. M. Davies, *Supt.* ..... Lyon Mountain, N. Y.
M. L. French, *Asst. Supt.* ..... Plattsburg, N. Y.
Chattahoochee R. R. 4-8½ g. 2 m.
J. B. Snowball, *Man.* ..... Chattahoochee, Fla.
Chattaroi Ry. 4-8½ g. 51 miles 11 loco. 483 cars.
F. H. Oliphant, *Gen. Man.* ..... Richmond, Va.
J. R. Martin, *M. M.* ..... Ashland, Ky.
D. L. Weaver, *M. M.* ..... Ashland, Ky.
Cheraw & Chester R. R. (*See Rich. & Dan.; (2) Div.*)
Cheraw & Darlington R. R. (*See Wil. & Wel.*)
Chesapeake & Ohio R. R. (*See Wil. & Wel.*)
Cherokee R. R. (*See East & West.*)
Cherry Fork R. R. 4-8½ g. 6 m. 1 lo. 6 cars.
E. T. Herndon, *Supt.* ..... Midland, Mo.
Chesapeake, Ohio & South-Western.
4-8½ g. 1,345 c.
Jas. L. Frazier, *Supt.* ..... Louisville, Ky.
H. E. Huntington, *Asst Gen. Supt.* ..... Louisville, Ky.
J. A. Dew, *Asst. Trans* ..... Louisville, Ky.
R. H. Briggs, *Supt. M. P.* ..... Paducah, Ky.
D. L. Weaver, *M. M.* ..... Elizabethtown, Ky.
Jno. Fitzgerald, *M. M.* ..... Paducah, Ky.
Chesapeake & Ohio R. R. 4-8½ g. 642 m. 169 l. 5,129 c.
C. W. Smith, *Gen. Man.* ..... Richmond, Va.
D. A. Sweet, *Asst. to Gen. Man.* Richmond, Va.
A. S. Bingham, *Gen. Supt.* ..... Richmond, Va.
T. L. Chapman, *Supt. M. P.* ..... Richmond, Va.
Hunt. Div.: W. B. Ryder, *Supt* ..... Richmond, Va.
W. H. Thomas, *M. M.*, Huntington, W. Va.
H. G. Bassinger, *M. C. B.* Huntington, W. Va.
Lex. Div.: Jos. Wood, *Supt.* ..... Lexington, Ky.
S. R. Tuggle, *M. M.* ..... Lexington, Ky.
K. C. & Ohio Ry. ..... Covington, Ky.
W. T. Smith, *M. M.* ..... Covington, Ky.
Chesnut R. R. 4-8½ g. 80 m. 31 lo. 531 cars.
R. Stewart, *Gen. Man.* ..... Keene, N. H.
H. H. Stone, *Pur. Agt.* ..... Keene, N. H.
F. A. Perry, *M. M.* ..... Keene, N. H.
A. E. Howard, *M. C. B.* ..... Keene, N. H.
Chester & Lenoir Ry. (*See Rich. & Dan.; (3) Div.*)
Chicago, Bur. & Kan. City Ry. (*See C., R. I. & Q.*)
Chicago, nurington & Quincy R. R.
4-8½ g. 1,500 m. 1,000 lo. 21,012 cars.
T. J. Potter, *Gen. Man.* ..... Chicago, Ill.
(1) C., B., Q. East of Mo. Riv.
H. B. Stone, *Gen. Supt.* ..... Chicago, Ill.
Wm. Irving, *Gen. Pur. Agt.* ..... Chicago, Ill.
G. W. Rhodes, *Supt. M. P.* ..... Aurora, Ill.
Wm. Forsyth, *Mech. Eng.* ..... Aurora, Ill.
Ill. Div.: C. Bealer, *Supt.* ..... Galesburg, Ill.
Chi. Div.: Geo. Wentworth, *Supt.* ..... Galesburg, Ill.
L. E. Johnson, *M. M.* ..... Aurora, Ill.
Galesburg Div.: Rice, *Supt* (tie-burg, Ill.
Robert Colville, *M. M.* ..... Galesburg, Ill.
St. L. Div.: W. C. Brown, *Supt.* Beardstown, Ill.
A. E. Mason, *M. M.* ..... Beardstown, Ill.
Ia. & Mo. Divs.: W. F. Merrill, *Supt.* Burlington, Ia.
East. Div.: O. B. Stewart, *Supt.* Burlington, Ia.
Joel West, *M. M.* ..... Burlington, Ia.
Mid. Div.: J. B. Maxon, *Supt.* ..... Ottumwa, Ia.
West. Div.: J. H. Dugnin, *Supt.* ..... Creston, Ia.
C. W. Eckerson, *M. M.* ..... Creston, Ia.
Chi., R. & Kan. City and St. L., Keo. & N. W'n Rys.
Robt. Law, *Gen. Supt.* ..... Keokuk, Ia.
W. H. Bardett, *M. M.* ..... Burlington, Ia.
(2) C. B. & Q. West of Mo. Riv.
G. W. Holdrege, *Asst. Gen. Man.* Omaha, Neb.
C. M. Wead, *Supt. Equip.* ..... Omaha, Neb.
D. Hawksworth, *M. M.* ..... Plattsmouth, Neb.
C. M. Wead, *Storek'pr.* ..... Plattsmouth, Neb.
Bur. & Mo. Riv. & Neb. Ry. Divs.:
T. E. Calvert, *Gen. Supt.* ..... Lincoln, Neb.
D. E. Thompson, *Supt.* ..... Lincoln, Neb.
E. Bignell, *M. M.* ..... Lincoln, Neb.
R. V. Div.: A. Campbell, *Supt.* McCook, Neb.
A. & S. Div.: J. McConnell, *Supt.* Lincoln, Neb.
Chicago, Fairchild & Eau Claire R. R.
4-8½ g. 40 m. 4 lo. 28 cars.
N. C. Foster, *Gen. Man.* ..... Fairchild, Wis.
C. J. Wickersham, *Pur. Agt.* ..... Chicago, Ill.
Chicago, Iowa & Dakota Ry. 4-8½ g. 69 cars.
John Porter, *Gen. Man.* ..... Eldora, Ia.
Chicago, Milwaukee & St. Paul R. R.
4-8½ g. 5,201 m. 620 lo. 19,018 cars.
S. S. Merrill, *Gen. Man.* ..... Milwaukee, Wis.
R. Miller, *Asst. Gen. Man.* ..... Milwaukee, Wis.
J. T. Clark, *Gen. Supt.* ..... Milwaukee, Wis.
A. J. Earling, *Asst. Gen. Supt.* Milwaukee, Wis.
J. T. Crocker, *Pur. Agt.* ..... Milwaukee, Wis.
J. M. Lowe, *Gen. M. M.* ..... Milwaukee, Wis.
E. Fairbairn, *M. M.* ..... Milwaukee, Wis.
John Bailie, *Supt. Car Dept.* Milwaukee, Wis.
W. E. Hibbard, *M. C. B.

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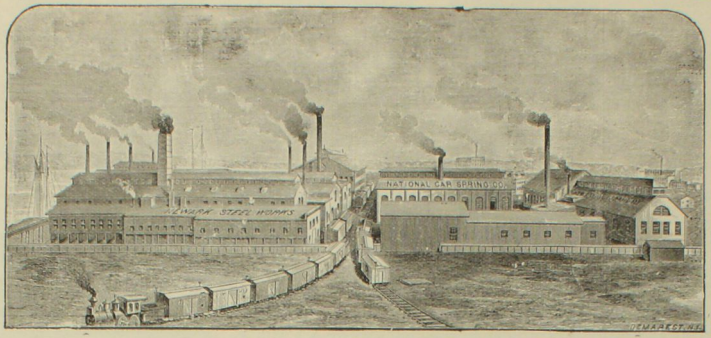

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HOPKINS VERSUS LE ROY!

THE QUESTION.

Does the Le Roy Journal Bearing Company "stand ready" to make what are commonly known as Hopkins Journal Bearings, because of numerous disgusting failures, resulting from the use of the weak, gridiron arrangement known as the Le Roy Bearing heretofore made and sold by them, and the consequent necessity of going out of business or giving their customers a really good bearing even if they have to "pirate" the invention for which a patent was granted to Hopkins that has been declared valid by both the Eastern and Western Railroad Association?

Does the Le Roy Company expect to build up a business by infringing Hopkins' Patent, and selling bearings, and a lawsuit with them?

In the recent interference patent fight between Hopkins and Le Roy, the Commissioner of Patents, in his final decision, which was rendered August 31, 1883, says:

"On the broad claim, as well as the specific claim covering the device embodying not only the broad but the specific invention of a journal bearing with a soft metal lining, with ridges or projections so arranged that, upon being brought in contact with the axle, the ridges or projections will yield and spread out so as to make a perfectly-fitting box, priority of invention must be awarded to Hopkins."

As to the specific arrangement for which priority of invention was awarded to Le Roy, all will perceive that the broad claim for which priority of invention is awarded to Hopkins, and the very broad claim embodied in the patent granted him Oct. 16, 1883, in the following words: "A Journal Bearing made of two different metals, one of soft or yielding nature, and the other of a hard or unyielding nature, the soft or yielding carrying ridges or spurs which receive the initial pressure of the journal, and by the rolling action of the same and the load pressure upon the bearing becomes crushed down and spread in conformity with the contour thereof, as described, whereby the surfaces in wearing contact are adjusted to each other, substantially as specified,"

COVERS THE WHOLE CASE

AN OLD ADAGE SAYS:
"SUE A BEGGAR AND CATCH A LOUSE."

Will Mr. McLean, of the so-called Le Roy Journal Bearing Co., give to Mr. Hopkins and to Railroad Companies and Car-Builders any reliable proof that his Company is in reality anything else than an irresponsible piratical concern (see his advertisement) that is absolutely judgment proof, and any guarantees it may offer against suits by Hopkins are not perfectly worthless, and in so doing will he talk plain, honest common sense, instead of craftily stringing together a lot of words (see his advertisement) that mean nothing unless they mislead?

No invention ever did or can infringe any patent. It is not the invention in any case that infringes, but the making, selling or using of a thing patented without the right to do so. Talk about making an offer to settle a point that does not exist is as cheap as it is misleading and worthless.

As to his being the prior inventor of Bearings with soft metal ridges for receiving the Initial pressure of the Journal, and leaves him absolute master of the situation.

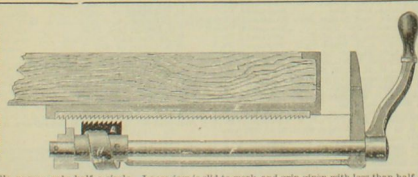
All parties are hereby warned that my rights under said Letters Patent will be enforced.

D. A. HOPKINS, Patentee and Manufacturer,

113 Liberty Street, - - - - New York.

MASSEY'S E. & K. Patent Iron and Wood Workers'

VISES.



Handle moves only half a circle. Loose jaw is slid to work, and grip given with less than half a turn of handle. Hand holding handle pushes loose jaw to and grips work with one motion. Sold by the Trade. Send for descriptive circular

T. C. MASSEY, Sole Manufacturer, 11 to 23 S. Jefferson St., Chicago, Ill.
Eastern Depot: LINK BELT MACHINERY CO., 81 John St., New York.

The handle starts from the perpendicular and moves to the right. When the handle is at the quarter of the circle or to a horizontal position, the cam *H* has lifted teeth of dog *L* into gear with teeth of long rack *E*, the spiral on end of cam having at the same time taken up all lost motion. By pressing the handle slightly lower, the work is firmly gripped between the jaws.

PINTSCH LIGHTING COMPANY,

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Cincinnati, Hamilton & Indianapolis R. R.
4-8½ g. 98 m
C. J. Hepburn, *Supt*.....Cincinnati, O.
Day & Mich. Div.:
Cincinnati, Indianapolis, St. Louis & Chicago Ry.
4-8½ g. 384 m. 71 to 3,270 cars.
J. W. Sherwood, *Supt*.....Indianapolis, Ind.
Geo. Tozzer, *Pur. Agt*.....Cincinnati, O.
J. S. Patterson, *M. of Mach. & M. C. B.*.....Cincinnati, O.
Cincinnati, New Orleans & Texas Pacific Ry. Co.
5 g. 840 m. 123 to 1,404 cars.
John Scott, *Gen. Man*.....Cincinnati, O.
Richard Carroll, *Gen. Supt*.....Cincinnati, O.
R. W. Healey, *Gen. Pur. Agt*.....Cincinnati, O.
James Meehan, *S. M. P. & M.*.....Cincinnati, O.
Cin. So. Div.: W. W. Wells, *Supt.*, Somerset, Ky.
J. L. Tomlinson, *Asst. S. M. P.*, Ludlow, Ky
John Richardson, *M. C. B.*.....Cincinnati, O.
A. Thomson, *M. M.*.....Chattanooga, Tenn.
Ala. Gr. S'n Div.: D. McLaren, *Supt.*, and
George Mannell, *M. M.*.....Chattanooga, Tenn
J. M. Kelly, *M. C. B.*.....Chattanooga, Tenn
V. & M. Div.: E. F. Kaworth, *Supt.*, and
W. ——.....Vicksburg, Miss.
V. S. & P. Div.: F. Y. Dabney, *Supt.*, Monroe, La.
W. Bell Smith, *M. M. & M. C. B.*.....Monroe, La.
New Orleans & North-Eastern R. R.
Edmund L. Tyler, *supt*.....New Orleans, La.
I. W. Powles, *M. M.*.....Cumberland, O.
Cincinnati Northern Ry
Geo. Barclay, *Gen. Man*.....Cincinnati, O.
Cincinnati, Richmond & Chicago R. R. 4-9 g. 37 m.
C. J. Hepburn, *Supt*.....Cincinnati, O.
Cincinnati, Selma & Mobile R. R. 5 g. 71 m. 14 to 146 c.
A. McCollister, *Supt*.....Selma, Ala.
H. L. Wright, *Pur. Agt*.....Selma, Ala.
J. M. Levis, *M. M.*.....Marion, Ala.
Cincinnati, Van Wert & Michigan R. R.
4-9 g. 81 m. 7 to 108 cars.
E. Garrison, *Gen. Man*.....Van Wert, O.
D. R. Ennis, *Supt. & M. M.*.....Van Wert, O.
H. H. Garr, *M. M. & M. C. B.*.....Van Wert, O.
Cin., Wabash & Mich. Ry. 4-8½ g. 165 m. 13 to 402 c.
Norman Beckley (*Cor. Mem. of P. A. Elkhart, Ind.*
O. W. Lamport, *Supt*.....Wabash, Ind.
S. B. Tinker, *M. M. & M. C. B.*.....Wabash, Ind.
Cin., Wash. & Balt. 4-8½ g. 312 m. 65 to 1,422 cars
Jas. H. Stewart, *Gen. Man*.....Cincinnati, O.
Edw. Evans, *M. M.*.....Cincinnati, O.
T. G. Duncan, *Supt. Car Dept*.....Zaleski, O.
Cincinnati, Wheeling & New York R. R. 4-8½ g. 13 m.
E. L. Winstanley, *Gen. Man*.....Cumberland, O.
Cincinnati & Eastern Ry. 3 g. 68 m. 6 to 133 cars.
4-8½ g. 50 m. 3 lo.
S. Woodward, *Rec*.....Cincinnati, O.
G. H. Willcox, *Gen. Sup. & Pur. Agt*. Cincinnati, O.
A. Donaldson, *M. M.*.....Newtown, O.
Cincinnati & South-Eastern Ry.
4-8½ g. 18 m.
John V. Dalton, *Gen. Man*.....Newport, Ky.
Clarksburg, Weston & Glenville R. R.
3 g. 26 m. 3 to 45 cars.
A. H. Kinst, *Pres. & Gen. Man*.Weston, W. Va.
Sam. A. Steel, *M. M.*.....Weston, W. Va.
F. Hill, *M. C. B.*.....Clarksburg, W. Va.
Cleveland, Columbus, Cincinnati & indiana and Indianapolis & St. Louis Rys. and Dayton & Union R. R. 4-8½ g. 785 m. 151 to 7,085 cars.
E. B. Thomas, *Gen. Man*.....Cleveland, O.
J. D. Yale, *Pur. Agt*.....Cleveland, O.
W. F. Turrell, *Gen. M. M.*.....Cleveland, O.
Col. & Cin. Div., Robt. Blee, *Supt*.Cleveland, O.
Wm. Garsing, *M. M.*.....Cleveland, O.
A. G. Steinbrenner, *G. For. Car Dept*. do.
Ind'p'lis Div.: John O. Ewan, *Asst. Ind'p'lis*, Ind.
T. W. Ranson, *M. M.*.....Brightwood, Ind.
N. Mark, *G. For. Car Dept*. Brightwood, Ind.
Ind. & St. L. Ry.: Thos. Brown, *Supt.*, St. Louis, Mo.
T. W. Ranson, *M. M. & C. B.* Brightwood, Ind.
Day. & Besotted Div.: Thos. Brown, *Supt.*, Dayton, O.
H. S. Gordon, *Pur. M. Shops*.....Dayton, O.
Cleve'l, Delphos & St. Louis R. R. 3 g. 56 m. 3 to 39 c.
I. H. Burgoon, *Gen. Man*.....Delphos, O.
B. F. Marshall, *M. M.*.....Delphos, O.
Cleveland, Indiana & St. Louis R. R.
4-8½ g. 19 m. 2 lo. 20 cars.
J. A. Larned, *Rec. & Supt*.....Anderson, Ind.
Cleveland, Mt. Vernon & Delaware R. R.
4-9 g. 144 m. 24 lo. 886 c.
N. Monsarrat, *Gen. Supt*.....Akron, O.
G. M. Taylor, *M. M. & C. B.*.....Mt. Vernon, O.
Cleve., Youngstown & Pitts. R. R. 3 g. 30 m. 3 lo. 138 c.
D. T. Lumley, *Gen. Supt*.....Cleveland, O.
C. H. Dorman, *M. M. & M. C. B.*.....Alliance, O.
Cleveland, Lorain & Wheeling Ry.
4-8½ g. 138 m. 51 lo. 1,878 cars.
Oscar Townsend, *Gen. Man*.....Cleveland, O.
Wm. Thornburg, *Supt*.....Lorain, O.
W. A. Stone, *M. M.*.....Lorain, O.
Cleve. & Marietta R. R. (*See Wheel. & Lake Erie.*)
Cleveland & Pittsburg. (*See Penn. Co. Div.*)
Clifton & Port Hudson R. R. 4-8½ g. 22 m. 3 lo. 12 c.
W. Pipes, *Supt*.....Clinton, La.
W. Y. Lockwood, *M. M.*.....Clinton La.
Clove Branch R. R. 4-8½ g. 4 m. 1 lo. 61 cars.
C. L. Kimball, *Supt*.....Ansonia, Ohio.
W. G. Vanbuskirk, *M. M.*.....Dutchess Jc., N. Y.
Coburg, Peterborough & Marmora Ry.
5-6 g. 47 m. 5 lo. 255 cars.
Jas. R. Barker, *Gen. Supt*.....Cobourg, Ont.
Alex. Clark, *M. M.*.....Cobourg, Ont.
John Tinney, *M. C. B.*.....Cobourg, Ont.
Colorado Central R. R. (*See Un. Pac. Div.*)
Columbia & Greenville R. R. (*See Rich. & D. Div.*)
Columbia & Puget Sound R.R. 3 g. 21 m. 7 lo. 114 c.
J. L. Howard, *Gen. Man*.....Tacoma, Cal.
Columbus, Hocking Valley & Toledo Ry.
Main Line. 3 g. 304 m. 50 lo. 7,353 cars.
G. R. Carr, *Gen. Supt*.....Columbus, O.
W. M. Greene, *Pur. Agt*.....Columbus, O.
Ira G. Hutchins, *M. M.*.....Columbus, O.
J. M. Rockafield, *M. C. B.*.....Columbus, O.
Col. Div.: M. T. Seymour, *Supt*.....Columbus, O.
Hock. V. Div.: M. L. Booth, *Supt*.....Columbus, O.
Ohio Riv. Div.: C. D. Norris, *Supt*.....Logan, O.
Columbus & Eastern R. R. In progress.
J. E. Redfield, *Pres*.....Columbus, Ohio.
Columbus & Maysville Ry. (*See Cin. & Zust.*)
Columbus & Rome R. R. 3 g. 33 m. 3 lo. 36 cars.
M. E. Gray, *Supt*.....Col'mbus, Ga.
Columbus & Western Ry. 5 g. 80 m. 6 lo. 53 cars
E. A. Flewellen, *Gen. Man*.....Columbus, Ga.
R. A. Bridges, *M. M.*.....Opelika, Ala.
Concord R. R. 4-8½ g. 141 m. 41 lo. 1,804 cars
H. E. Chamberlin, *Supt. & P. Agt*. Concord, N. H
J. T. Gordon, *M. M. & M. C. B.*.....Concord, N. H
Concord & Claremont R. R. (*See Northern of N. H.*
Conn. Riv. and Ver. Val. R. Rs. 4-8½ g. 130 m. 42 lo. 554 c.
F. Mulligan, *Supt. & Pur. Agt*. Springfield, Mass.
W. H. Stearns, *M. M. & M. C. B.* Springfield, Mass.
Conn. & Passumpsic R. R. (*See Passumpsic.*)
Connotton Valley R. R. 3 g. 160 m. 26 lo. 1,036 cars.
Samuel Briggs, *Gen. Man*.....Cleveland, O
John Bean, *M. M.*.....Canton, O.
Cooperstown & Susquenanna Valley R. R.
4-8½ g. 16 m. 2 lo. 14 cars.
Andrew Shaw, *Pres*.....Cooperstown, N. Y.
A. Mumford, *M. M.*.....Cooperstown, N. Y.
Corning, Cowanesque & Antrim Ry. (*See Fall Brook.*)
Cornwall R. R. 4-8½ g. 12 m. 5 lo. 166 cars
J. M. Havard, *G. Supt. & M. M.*.....Lebanon, Pa.
Levi Bionch, *M. C. B.*.....Lebanon, Pa.
Cornwall & Lebanon R. R. 4-9 g. 5 m.
J. C. Jennings, *Supt*.....Lebanon, Pa.
Coudersport & Port Allegheny R. R.
3 g. 17 m. 3 lo. 45 cars.
B. A. McClure, *Gen. Supt*.....Coudersport, Pa.
Credit Valley Ry. 4-8½ g. 184 m. 32 lo. 535 cars.
Wm. White, *Gen. Pass. Agt*.....Toronto, Ont.
John Macnab, *Pur. Agt*.....Toronto, Can
D. Preston, *Mech. Supt*.....Toronto, Can
Crooked Creek R. R. 3 g. 9 m. 1 lo. 37 cars.
Walter C. Willson, *Gen. Man*. Webster City, Ia
Geo. W. Post, *Pur. Agt*.....Lehigh, Ia
Crown Point Iron Co. R. R. 3 g. 13 m. 4 lo. 113 c.
A. L. Inman, *Gen. Man*.....Plattsburg, N. Y.
H. L. Reed, *Pur. Agt*.....Crown Point, N. Y.
J. M. Davis, *Supt. & M. M.* Crown Point, N. Y.
J. C. Sherman, *M. C. B.*.....Crown Point, N. Y.

Cumberland Ry. 4-8½ g. 32 m. 1 lo. 64 c.
J. A. Killam, *Gen. Man*.....Parsboro, N. S.
R. McKinnon, *M. M.*.....Parsboro, N. S.
Cumberland Valley R. R. 4-9 g. 127 m. 23 to. 474 cars.
J. F. Boyd, *Supt*.....Chambersburg, Pa.
A. S. Hull, *M. M.*.....Chambersburg, Pa.
C. Weiss, *M. C. B.*.....Chambersburg, Pa.
Cumberland & Maurice River R. R. 4-8½ g. 22 m.
L. H. Dowdney, *Supt*.....Port Norris, N. J.
Cumberland & Ohio R. R. 4-8½ g. 78 m. 3 lo. 34 c.
G. E. Henderson, *Rec. & Man*.....Olney, Ill.
A. Bell, *M. & C. B.*.....Kansas, Ill.
Dayton & Union R. R. (*See Clev., Col., Cin. & Ind.*)
Dayton & Michigan R. R. (*See Cin., Ham. & Day.*)
Del., Lackawanna & W. and N. Y., Lack. & W. Rs.
4-8½ g. 930 m. 436 lo. 31,989 cars.
Wm. H. Haldeman, *Gen. Supt*.....Scranton, Pa.
G. W. B. Cushing, *Pur. Agt*.....New York, N. Y.
Walter Dawson, *Mast. of Mach*.....Scranton, Pa.
Robt. Brenna, *M. M.*.....Scranton, Pa.
Bloomsb'g Div.: C. Graham, *M. M.*.Kingston, Pa.
Utica Div.: A. C. Shaw, *Secretary, Supt*.....Utica, N. Y.
Thos. Thatcher, *M. M.*.....Utica, N. Y.
Morris & Essex Div.: Sussex: F. & D. and C. R. Rs.
A. Reasoner, *Supt*.....Hoboken, N. J.
W. H. Lewis, *M. M.*.....Kingsland, N. J.
W. J. Baker, *M. of Car Rep*.....Dover, N. J.
Oswego & Syracuse Div.:
W. B. Phelps, *Supt*.....Oswego, N. Y.
Jas. Buchanan, *M. M.*.....Syracuse, N. Y.
Syracuse, Binghamton & New York R. R.
4-8½ g. 81 m. 30 lo. 598 cars.
W. K. Wiver, *Gen. Supt*.....Syracuse, N. Y.
Jas. Buchanan, *M. M.*.....Syracuse, N. Y.
Cayuga Div.: W. R. Humphrey, *Supt*.....Ithaca, N. Y.
Buffalo Div.: T. B. Griffith, *M. M.*, Buffalo, N. Y.
Delaware, Lackawanna & Western R. R.
4-8½ g. 101 m. 7 lo. 145 cars.
Thos. Groom, *Supt*.....Lewes, Del.
Geo. Bennett, *M. M.*.....Lewes, Del.
W. H. Virden, *M. C. B.*.....Lewes, Del.
Delaware River R. R. 4-8½ g. 20 m. 1 lo. 4 cars.
E. B. Green, *Supt*.....Pedricktown, N. J.
Delaware Western R. R. (*See Balt. & Phil.*)
Delaware & Chesapeake R. R. (*See Penn. Co. Div.*)
Delaware & Hudson Canal Co.
4-3 and 4-8½ g. 180 lo. 10,799 cars.
C. F. Young, *Pres. & Gen. Man*.Honesdale, Pa.
H. E. Young, *Asst. Gen. Man*.....Honesdale, Pa.
J. Wilson Sprout, *Pur. Agt*.....Scranton, Pa.
R. C. Blackall, *Supt. of Mach*.....Albany, N. Y.
Susq. Div.: C. D. Hammond, *Supt*.....Albany, N. Y.
Tho. Howard, *M. M.*.....Oneonta, N. Y.
J. R. Skinner, *M. C. B.*.....Oneonta, N. Y.
Sar. & Ch. Div.: T. Forbes, *Supt*.....Albany, N. Y.
J. L. Corey, *M. M.*.....Green Island, N. Y.
Chas. Hubbard, *M. C. B.*.....Green Island, N. Y.
Pa. Div.: R. Manville, *Supt & Pur. Agt*. and
S. H. Dotterer, *M. M.*.....Carbondale, Pa.
T. Orchard, *M. C. B.*.....Carbondale, Pa.
Denver Circle R. R. 3 g. 12 m. 7 lo. 15 cars
Thos. C. Henry, *Gen. Man*.....Denver, Col.
J. H. Bedson, *Gen. Supt*.....Denver, Col.
Denver, Utah & Pacific R. R. 3 g. 34 m. 4 lo. 171 c.
M. Fouts, *Supt*.....Denver, Col.
Denver & New Orleans. 4-8½ g. 140 m. 11 lo. 400 c.
C. W. Fisher, *Gen. Man*.....Denver, Col.
Chas. Wheeler, *Pur. Agt*.....Denver, Col.
J. H. Kirk, *M. M. & M. C. B.*.....Denver, Col.
Denver & Rio Grande. 3 g. 1,317 m. 200 lo. 9,000 c.
W. A. Jackson, *Rec*.....Denver, Col.
C. M. Hobbs, *Pur. Agt*.....Denver, Col.
W. H. Sample, *Asst. M. P. & M.*.....Denver, Col.
(1) Col & N. M. Div.: R. E. Ricker, *G. S. Denver*, Col
1st Div.: W. W. Borst, *Supt*.....Salida, Col.
2d Div.: Cole Lydon *Supt*.....Alamosa, Col.
3d Div.: G. W. Cook, *Supt*.....Leadville, Col
4th Div.: R. M. Ridgway, *Supt*.....Alamosa, Col.
Denver, Rio Grande & Western Ry. 3 g. 360 m
W. H. Bancroft, *Rec. & Gen. Supt*.....
Salt Lake City, Utah.
A. L. Horner, *Asst' Supt* Salt Lake City, Utah.
S. C. Smith, *M. M.*.....Salt Lake City, Utah.
Des Moines, Osceola & Southern R. R.
3 g. 100 m. 7 lo. 353 cars.
L. B. Harding, *Gen. Man*.....Des Moines, Ia.
Henry Strivers, *Supt*.....Osceola, Ia.
L. D. Berry, *M. M.*.....Des Moines, Ia.
Elias Tonet, *M. C. B.*.....Osceola, Ia.
Des Moines & Ft. Dodge Ry. 4-8½ g. 144 m. 10 lo. 350 c
C. N. Gilmore, *Supt*.....Des Moines, Ia.
John McGrayel, *M. M.*.....Grand Junction, Ia.
E. A. Wolf, *M. C. B.*.....Grand Junction, Ia.
Det., Bay City & Alpena R. R. 3-2 g. 48 m. 5 lo. 327 c.
John Eastman, *Supt*.....East Tawas, Mich.
Det., Gr. H. & Mil. Ry. 4-8½ g. 280 m. 30 lo. 1,500 c.
W. J. Spicer, *Gen. Man*.....Detroit, Mich.
John S. Lorimer, *Storekeeper*.....Detroit, Mich.
W. J. Morgan, *Supt*.....Detroit, Mich.
H. Hunsberger, *Mech. Supt*.....Port Huron, Mich.
R. F. Bailie, *M. M.*.....Grand Rapids, Mich.
Det., Lansing & No'n R. R. 4-8½ g. 222 m. 84 lo. 1027 c
John H. Hollenbeck, *Man*.....Detroit, Mich.
Allan Bourn, *Pur. Agt*.....Detroit, Mich.
Thos. M. Fish, *Gen. Supt*.....Ionia, Mich.
G. C. Watrous, *M. C. B.*.....Ionia, Mich.
Det., Mack. & Marq. R. R. 4-8½ g. 152 m. 16 lo. 1,112 c.
D. McCool, *Gen. Supt*.....Marquette, Mich.
W. J. Tesch, *Pur. Agt*.....Marquette, Mich.
John B. Wilson, *Mech. Supt*.....Marquette, Mich.
Dorchester & Delaware R. R. (*See Penn. Co. Div.*)
Dubuque & Dakota R. R. 4-8½ g. 64 m. 2 lo. 54 cars.
Jas. Stanwood, *Gen. Man*.....Dubuque, Ia.
W. S. Couch, *Pur. Agt*.....Dubuque, Ia.
Duck River Valley R. R. (*See Nash., Chat. & St. L.*)
Dunkirk, Allegheny Valley & Pittsburg R. R.
4-8½ g. 91 m. 14 lo. 102 cars.
D. Thayer, *Gen. Supt*.....Dunkirk, N. Y.
R. C. Moore, *Pur. Agt*.....New York, N. Y.
J. C. Haggett *M. & C. B.*.....Dunkirk. N. Y.

East Alabama Ry. 5 g. 22 m. 3 lo. 19 cars.
W. H. Sayre, *Supt*.....Atlanta, Ga.
East Broad Top R. R. 3 g. 30 m. 7 lo. 360 cars.
A. W. Sims, *Supt*.....Orbisonia, Pa.
A. W. Grosscup, *M. M.*.....Orbisonia, Pa.
East St. Louis & Carondelet Ry. 4-9 g. 4 lo. 37 c.
Joseph Hill, *Gen. Supt*.....East St. Louis, Ill.
East Tenn. & Western North Car. R. R.
3 g. 94 m. 3 lo. 73 cars.
Thomas E. Mason, *Supt*.....Johnsthetton, Tenn
East Tennessee, Virginia & Georgia R. R.
1,453 m. 173 lo. 5,670 cars.
Henry Fink, *V. P. & Gen. Man*.Knoxville, Tenn
J. E. O'Brien, *Gen. Supt*.....Knoxville, Tenn
J. E. Sharp, *Pur. Agt*.....Knoxville, Tenn
East Tenn. Div. and No. Car. and Ohio Branches:
F. K. Huger, *Supt*.....Knoxville, Tenn.
B. J. Sitton, *M. M.*.....Knoxville, Tenn.
Jos. Armbruster, *M. C. B.*.....Knoxville, Tenn.
Alabama Div.: J. M. Bridges, *Supt*.....Selma, Ala.
Simon Gay, *M. M.*.....Selma, Ala.
W. W. Pierce, *M. C. B.*.....Selma, Ala.
Memphis & Charleston R. R. (Div.):
R. B. Pegram, Jr., *Supt*.....Memphis, Tenn
H. N. Hufford, *M. M.*.....Memphis Tenn
Georgia Div.: J. W. Fry, *Supt*.....Atlanta, Ga.
J. E. Mallory, *Asst Supt*.....Macon, Ga.
W. A. Walden, *M. M.*.....Atlanta, Ga.
J. H. Perkins, *M. C. B.*.....Atlanta, Ga.
East & West R. R. of Ala. 3 g. 110 m. 9 lo. 85 c
John Postell, *Manager*.....Cedartown, Ga.
J. Hall, *M. C. B.*.....Cedartown, Ga.
Eastern R. R. 4-8½ g. 293 m. 110 lo. 2,208 cars.
Payson Tucker, *Gen. Man*.....Boston, Mass.
D. W. Sanborn, *Mast. of Trans.*, Boston, Mass.

G. F. Hurd, *Pur. Agt*.....Boston, Mass.
Amos Pilsbury, *S. M. P. & M.*.....E. Boston, Mass.
A. M. Waitt, *G. For. Car Dept*.....Salem, Mass.
Con'y Div.: J. W. Sanborn, *Supt*, Wolfboro J., N. H.
Eastern Kentucky R. R. 4-8½ g. 34 m. 5 lo. 160 c.
H. W. Bates, *Man. & Pur. Agt*.....Elmira, N. Y.
H. W. Crawford, *M. M.*.....Hunnewell, Ky.
Eastern (Maine) R. R. (*See Maine Central.*)
Eastern Shore R. R. 4-8½ g. 38 m. 3 lo. 9 c
W. Thompson, *Supt*.....Princess Anne, Md.
F. T. Bursell, *Gen. Supt & P. A.* Cumberland, Md.
Elberton Air-Line R.R. (*See Rich. & Dan. N. G. Rrs.*)
Elizabeth City & Norfolk R. R. (*See Norfolk & So.*)
Elizabethtown, Lex. & Big Sandy R.R. (*See Ches. & O.*)
Elmira, Cortland & Northern R. R. 4-8½ g.
Geo. S. Sadler, *Supt*.....Elmira, N. Y.
Thos. Kearsley, *M. M.*.....Elmira, N. Y
Emmitsburg R. R. (*See Western Md.*)
Erie & Huron Ry. 4-8½ g. 40m
R. O. Mitchell, *Gen. Man*.....Toronto, Ont.
Erie & Pittsburg R. R. (*See Penna. Co. (Sub) Div.*)
Etowah & Deaton's R. R. 3 g. 9 m.
W. Rogers, *Gen. Man*.....Etowah, Ga.
Eureka Springs Ry. 4-8½ g. 19 m. 1 lo. 9 cars
John Adams, *Gen. Man*.Eureka Springs, Ark.
Eureka & Palisade R. R. 3 g. 155 cars.
B. Gilman, *Gen. Supt & Pur. Agt*.Eureka, Nev.
A. S. Langley, *M. C. B.*.....Palisade, Nev.
European & N. American R. R. (*See Maine Cen.*)
Evansville, Rockport & En'by. 4-8½ g. 58 m. 5 lo. 98 c
H. L. Shepard, *Supt*.....Evansville, Ind.
Evans. & Terre Haute. 4-8½ g. 100 m. 38 lo. 1,000 c.
D. J. Mackey, *Gen. Supt*.....Evansville, Ind.
John Torrance, *M. M.*.....Evansville, Ind.

Fitchburg R. R. 4-8½ g. 152 m. 100 lo. 3,566 cars.
John Adams, *Gen. Man*.....Boston, Mass.
F. S. Pratt, *Pur. Agt*.....Boston, Mass.
Orlando Stewart, *Supt. M. P.*.....Boston, Mass.
A. S. Hoitt, *Asst. Supt. M. P.*.Fitchburg, Mass.
J. W. Marden, *M. C. B.*.....Charlestown, Mass.
Flint & Pere Marq. 4-8½ g. 346 m. 78 lo. 2,004 cars.
H. C. Potter, *Gen. Man*.....E. Saginaw, Mich.
D. Edwards, *Asst. Gen. Man*. E. Saginaw, Mich
G. G. Cook, *Pur. Agt*.....E. Saginaw, Mich.
Sanford Keeler, *Gen. Supt*.....E. Saginaw, Mich.
W. F. Mahan, *Gen. M. C. B. Flint, Mich.*
M. V. Meredith, *Supt.* (W. Div.)E. Saginaw, Mich.
T. J. Hatswell, *M. M.*.....E. Saginaw, Mich.
H. M. Merry, *M. M.*.....Flint, Mich.
Florida Ry. & Nav. Co. 5 g. 488 m. 31 lo. 307 c.
R. D. Rasbo, *Gen. Supt*.....Jacksonville, Fla.
R. V. Dohoney, *M. M. & C. B* Fernandina, Fla.
Florida Southern Ry. 3 g. 91 m. 6 lo. 96 cars.
Jas. Gamble, *Comm. Gen. Man*.....Jacksonville, Fla.
Jas. D. Hollister, *Supt*.....Palatka, Fla.
Fonda, Johnstown & Gloversv'e. 4-8½ g. 20 m. 2 lo. 35 c
Lawton Caten, *Supt*.....Gloversville, N. Y.
J. Putman, *M. M.*.....Gloversville, N. Y.
Fond du Lac, Ashland & Peoria. 3g. 30 m. 2 lo. 55 c.
Alonzo Kinyon, *Supt. & P. A.* Fond du Lac, Wis.
Fort Dodge, Des Moines & So. R. R. 3 g. 52 c.
Franklin & Prov. & Hopkinton. 22 m.
Fred'k Logee, *Supt*.....Milford, Mass.
Ft. Madison & N. W. Ry. 3 g. 42 m. 3 lo. 121 c.
S. B. Kenrick, *Rec. & Pur. Agt*.Ft. Madison, Ia
H. M. Merry, *M. M. & C. B.*.....Ft. Madison, Ia
Ft. Wayne, Cin. & Louisv. 4-8½ g. 128 m. 10 lo. 250 c
White Water R. R. 4-8½ g. 65 m. 5 lo. 170 cars.
W. W. Wheatley, *Gen. Supt*.....Ft. Wayne, Ind.
T. H. Haberkorn, *M. M.*.....Ft. Wayne, Ind.
Jas. Hall, *M. C. B.*.....Ft. Wayne, Ind.
Ft. Worth & Denver City Ry. 4-8½ g. 114 m. 8 lo. 443 c
C. L. Frost, *Gen. Supt*.....Fort Worth, Tex.
Freeh'd & N. Y. Ry. 4-8½ g. 18 m. 1 lo. 62 c
J. E. Ralph, *Supt. & Pur. Agt*. Freehold, N. J
M. S. Mount, *M. M.*.....Freehold, N. J.
C. H. Suedeker, *M. C. B.*.....Freehold, N. J.
Fulton County N. G. Ry. 3 g. 61 m. 4 lo. 168 cars.
Jas. Anderson, *Sup't & P. Agt*. Lewiston, Ill.

Gainesville & Dahlonega R. R.
W. P. Price, *Pres*.....Dahlonega, Ga.
Gainesville, Jefferson & Southern R. R. (*See Cen. of Ga.*)
Galena & Chicago Union R. R. (*See Penn. Co. Div.*)
Galveston, Houston & Hend. R. R. (*See Mo. Pac. (S) Div.*)
Galveston, Sabine & St. Louis Ry.
4-8½ g. 15 m. 37 cars.
Brad. Barner, *Gen. Man*.....Longview, Tex.
Chas. Hall, *M. C. B.*.....Longview, Tex.
Geneva, Ithaca & Sayre R. R. (*See Lehigh Val.*)
George's Creek & Cumberland R. R.
3 g. 25 m. 2 lo. 212 cars.
J. A. Millholland, *Gen. Man*.Cumberland, Md.
Georgetown & D. R. R. 3 g. 24 m. 2 lo. 52 c.
G. W. Earle, *Gen. Supt*.....Georgetown, S. C
Georgia R. R. 5 g. 307 m. 42 lo. 1,048 cars.
John W. Green, *Gen. Man*.....Augusta, Ga.
John S. Cook, *M. M.*.....Augusta, Ga.
S. H. Peeler, *M. C. B.*.....Augusta, Ga.
Georgia Pacific Ry. 3 g. 218 m.
Y. Sage, *Gen. Supt*.....Birmingham, Ala.
S. H. Peeler, *M. C. B.*.....Greenville, Miss.
G. H. Barnum, *Dir. Supt*.....Columbus, Miss.
Gettysburg & Harrisburg R. R. 3 g. 32 m. 3 lo. 90 c.
W. H. Woodward, *Supt*.Pine Grove Furnace, Pa.
Grand Haven R. R. (*See Chic. & W. Mich.*)
Grand Island R. R. (*See Island of Can.*)
Grand Rapids, Indiana & Mackinaw. (*See Gr. R. & I.*)
Grand Rapids & Indiana. 4-8½ g. 328 m. 52 lo. 1,794 c.
W. O. Hughart, *Gen. Man*.Grand Rapids, Mich.
R. F. Bailie, *M. M.*.....Grand Rapids, Mich.
S. D. Bradley, *M. M.*.....Grand Rapids, Mich.
No'n Div.: P. S. Gormany, *Supt*.Bay City, Mich.
So'n Div.: P. S. O'Rourke, *Supt*.Fort Wayne, Ind.
Grand Southern Ry. of New Brunswick.
4-8½ g. 54 miles.
J. N. Greene, *Gen Man*.....St. George, N. B.
F. W. Hatch, *Supt*.....St. George, N. B.
Thomas Logan, *M. M.*.....St. George, N. B.
Grand Tower & Carbondale. 4-8½ g. 25 m. 3 lo. 357 c.
J. C. Stringham, *Supt*.....Carbondale, Ill.
Hugh Smith, *M. M.*.....Murphysboro, Ill.
Jas. Garrison, *Agt*.....St. Louis, Mo.
Grand Trunk. 4-8½ g. 2,332 m. 660 lo. 15,000 c.
Joseph Hickson, *Gen. Man*.....Montreal, Can.
Jas. Stephenson, *Gen. Supt*.....Montreal, Can.
Wm. Wainright, *Asst. Man*.....Montreal, Can.
Mont. Div.: W. Spicer, *Supt*.Montreal, Can.
Jno. Taylor, *Gen. Storekeeper*.Montreal, Can.
Herbert Wallis, *Mech. Supt*.....Montreal, Can.
Jno. Hickson, *Asst. Pur Dept*.Montreal, Can.
J. Haskoni, *Div. M. S*.....Richmond, P. Q.
Gt. West'n Div.: Chas. Stiff, *Supt*.Hamilton, Ont.
E. Bond Stone, *Pur. Agt*.....London, Ont.
C. K. Domville, *Mech. Supt*.....Hamilton, Ont.
J. Hobson, *M. M.*.....London, Ont.
J. D. McIlwain, *Supt. Car Dept*.London, Ont.
Chi. & Gr. Trunk Ry. 4-8½ g. 339 m. 103 lo. 1,191 c.
W. J. Spicer, *Gen. Man*.....Chicago, Ill.
W. H. Pettibone, *Supt*.....Battle Creek, Mich.
A. Ross, *M. M.*.....Fort Gratiot, Mich.
H. Roberts, *Mech. Supt*.....Detroit, Mich.
Midland of Can. 4-8½ g. 471 m. 44 lo. 1,421 c.
Wm. Wainright, *Gen. Man*.....Montreal, Can.
J. D. Barnet, *Mech. Supt*.....Peterboro, Ont.
Grand Tower, Georgiana & Lake Erie Ry. (*See Ill. C.*)
Great Western Ry. (*See Grand Trunk; G. W. Div.*)
Green Bay, Winona & St. Paul R. R.
4-8½ g. 250 m. 10 lo. 623 cars.
Timothy Case, *Gen. Man. & P. A* Green Bay, Wis.
Jerome B. Johnsonville Ry. 4-8½ g. 15 m. 1 lo. 7 c.
J. H. Thompson, *Supt*.....Greenwich, N. Y.
Gulf, Col. & Santa Fé Ry. 4-8½ g. 536 m. 31 lo. 1,400 c.
Webster Snyder, *Gen. Man*.Galveston, Texas.
Jno. W. Thorne, *Pur. Agt*.....Galveston, Texas.
W. H. Reilly, *M. M. & M. C. B.*.Galveston, Texas.
Gulf, Wis Texas & Pac. Ry. 4-8½ g. 68 m. 6 lo. 74 c.
M. D. Monserrat, *Supt & Pur. Agt*. Cuero, Tex.
James Mooney *M. M.*.....Cuero, Texas.

Hannibal & St. Jo. R. R. 4-8½ g. 202 m. 76 lo. 1,906 c.
J. F. Barnard, *Gen. Man*.....St Joseph, Mo.
S. E. Crance, *Gen. Supt*.....Hannibal, Mo.

Wm. Irving, *Pur. Agt*.....Chicago, Ill.
N. J. Paradise, *Supt. M. M.*.....Hannibal, Mo.
Chas. Collier, *For. Car Dept*.....Hannibal, Mo.
Hanover Branch R. R. 4-8½ g. 8 m. 1 lo. 18 cars.
E. Y. Parry, *Supt*.....South Hanover, Mass.
Hanover Junction, Hanover & Gettysburg R. R.
4-8½ g. 74 m. 10 lo. 140 cars.
H. D. Scott, *Gen. Supt*.....Gettysburg, Pa.
John J. Bingley *M. M.*.....Hanover, Pa.
Jas. Hartnorn, *M. C. B.*.....Hanover, Pa.
Harlem River & Portchester R. R. 4-8½ g. 20 m. 3 lo. 35 c.
R. H. Middleton, *Supt*.....Rolling Springs, Pa.
Hartford & Conn. V. R. R. 4-8½ g. 47 m. 9 lo. 196 c.
O. M. Shepard, *Supt*.....Hartford, Ct.
John Henry, *Jr., Supt. M. P.*.Hartford, Conn.
Hartford & Conn. W. R. R. 4-8½ g. 110 m. 10 lo. 465 c.
John F. Jones, *Supt*.....Hartford, Ct.
Jas. R. Barker, *M. M.*.....Hartford, Ct.
Hartwell R. R. (*See Rich. & Dan. N. G. Rrs.*)
Hecla & Torch Lake R. R. 4-1 g. 5 m. 5 lo. 165 cars.
W. A. Childs, *Gen. Man*.....Calumet, Mich.
Herkimer, Newport & Poland Ry.
3-6 g. 21 m. 2 lo. 24 cars.
Albert Wilber, *Supt*.....Herkimer, N. Y.
Hobart & Manistee River R. R. 3 g. 9 m. 2 lo. 42 c.
Hocking Valley R. R. (*See Columbus, Hock. V. & Tol.*)
Hot Springs R. R. 3 g. 25 m. 3 lo. 37 cars.
J. Gaughan, *Supt*.....Hot Springs, Ark.
L. Finlay, *M. M.*.....Malvern, Ark.
Housatonic R. R. 4-8½ g. 126 m. 23 lo. 879 cars.
H. B. Seymans, *Supt*.....Bridgeport, Ct.
D. S. Draper, *Pur. Agt*.....Bridgeport, Ct.
Hoosac Tunnel R. R. (*See Fitchburg.*)
J. J. Ferris, *M. C. B.*.....Falls Village, Ct.
Houston Belt Ry. 4-8½ and 3 gauge 16 miles.
Jos. Jordan, *V. P. & Gen. Man*.Houston, Tex.
Houston, East & West Tex. Ry. 3 g. 150 m. 10 lo. 570 c.
Paul Bremond, *Pres. & Pur. Agt*.Houston, Tex.
E. L. Bremond, *Gen. Man*.....Houston, Tex.
R. D. Diffey, *M. M.*.....Houston, Tex.
C. F. Smith, *M. C. B.*.....Houston, Texas.
Houston & Tex. Cen. Ry. 4-8½ g. 750 m. 78 lo. 2,926 c.
J. Waldo, *V. P. & Gen. Man*.....Houston, Tex.
A. H. Swinson, *Gen. Tr. Man*.....Houston, Tex.
Pur. Agt.....New York, N. Y
L. C. Noble, *Gen. Sup't*.....Houston, Tex.
James McGee, *M. C. B.*.....Houston, Tex.
So. & W. Div.: W. Howe, *Supt*.Houston, Tex.
No. & Mi. Divs.: G. A. Quinlan, *Supt*., Austin, Tex.
C. H. Burns, *Asst. M. M.*.....Corsicana, Tex.
No. & W'n Div.: Donald Allen, *Supt*.....Waco, Tex.
Humeston & Shenandoah R. R.
4-8½ g. 54 m. 2 lo. 18 lo. 80 cars.
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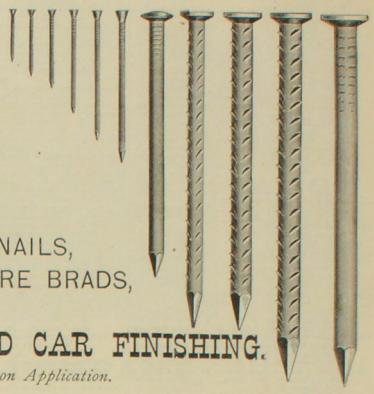

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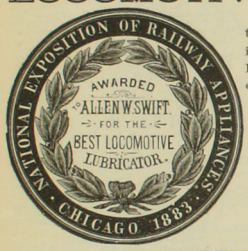

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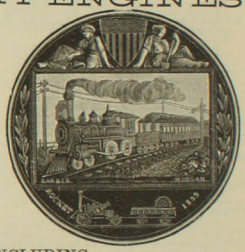

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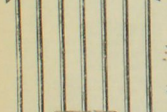

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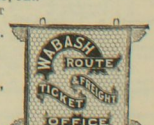

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A. N. Montier, *M. C. B.*.....Kansas City, Mo.
Kansas City, St. Joseph & Council Bluffs; and St. Jo. & Des Moines R. Rs. 4-8½ & 3 g. 308 m. 41 lo. 1,148 c.
J. F. Barnard, *Gen. Supt*.....St. Joseph, Mo.
J. R. Hardy, *Supt. Car*.....St. Joseph, Mo.
Wm. Irving, *Pur. Agt*.....Chicago, Ill.
F. A. Chase, *M. M.*.....St. Joseph, Mo.
Thos. Aylesbury, *Jr. For. Car. Dep.*St. Joseph, Mo.
Kansas City & Southern Ry.....4-8½ g. In progress.
Wm. Bailey, *Pres*.....Kansas City, Mo.
Kansas Coal Belt R. R.....4-8½ g. In progress.
C. H. Malin, *Gen. Man*.....Girard, Kan.
F. A. Hill, *Supt*.....Girard, Kan.
Kansas & Gulf Short Line R. R.....33 m. 2 lo. 32 cars.
Eli Culverhouse, *Gen. Man*.....Tyler, Tex.
V. K. Stevenson, *Pur. Agt*.....New York, N. Y.
Kendall & Eldred R. R.....4-8½ g. 2 m. 0 lo.
Kent Northern Ry.....4-8½ g. 27 m. 2 lo. 16 cars.
J. C. Brown, *Gen. Man*.....Richibucto, N. B.
Kentucky Central R. R.....4-8 g. 184 m. 29 lo. 640 cars.
G. W. Bender, *Supt*.....Covington, Ky.
W. T. Smith, *M. of Mach*.....Covington, Ky.
M. C. B......Covington, Ky.
Kentucky & South Atlantic Ry.....3 g. 23 m. 3 lo. 52 c.
Geo. B. Harper, *Supt. & P. A.*.....Tyler, Tex.
Geo. W. Lewis, *M. M.*.....Tyler, Tex.
Keokuk & Des Moines R.R.....4-8½ g. 16 m. 0 lo. 34 cars.
Kinzua R. R.....(*See Buf., N. Y. & Phil.*)
Kingston & Pembroke Ry.....4-8½ g. 104 m. 9 lo. 214 c.
B. W. Folger, *Supt*.....Kingston, Ont.
J. H. Taylor, *Pur. Agt*.....Kingston, Ont.
J. H. Taylor, *M. M.*.....Kingston, Ont.
Knox & Lincoln R. R.....4-8½ g. 49 m. 5 lo. 103 cars.
C. H. Coombs, *Supt*.....Bath, Me.
Wm. A. Field, *M. M.*.....Bath, Me.
C. L. Turner, *M. C. B.*.....Bath, Me.
Knoxville & Augusta R. R.....5 g. 16 m. 0 lo. 34 cars.
R. N. Hood, *Gen. Man. & P. Agt*.Knoxville, Tenn.
J. M. Hood, *Supt*.....Knoxville, Tenn.

L.

Lackawanna & Pittsburgh R. R.....3 g. 97 m.
Geo. W. Chapman, *Rec*.....Angelica, N. Y.
Lake Champlain & Moriah R. R.4-8½ g. 40 m. 2 lo. 250 c.
E. B. Redding, *Supt*.....Port Henry, N. Y.
Lake Erie & Western Ry. 4-8½ g. 388 m. 33 lo. 1,701 c.
J. H. Cheney, *Gen. Supt*.....Indianapolis, Ind.
D. S. Hill, *Gen. Supt*.....Bloomington, Ill.
T. F. Purdy, *Pur. Agt*.....Bloomington, Ill.
H. L. Cooper, *Supt. of Equipment*.....Linsa, O.
Lake George & Muskegon River R. R.
4-8½ g. 2 m. 0 lo. 2 cars.
W. S. Gerrish, *Gen. Man*.....Muskegon, Mich.
Lake Shore & Michigan So'n Ry.
4-8½ g. 1,340 m. 547 lo. 17,115 cars.
John Newell, *Gen. Man*.....Cleveland, O
F. P. Wright, *Gen. Supt*.....Cleveland, O.
L. G. Higgins, *Pur. Agt*.....Cleveland, O.
J. W. Stevens, *Supt. & P. A.*.....Cleveland, O.
John Kirby, *Gen. M. C. B.*.....Cleveland, O.
East'n Div.: C. B. Couch, *Supt*.....Cleveland, O.
J. S. Graham, *M. M.*.....Buffalo, N. Y.
A. C. Robson, *M. C. B.*.....Buffalo, N. Y.
L. O. Gassett, *M. M.*.....Cleveland, O
J. Withycombe, *M. C. B.*.....Cleveland, O.
Frank. Div.: G. H. McIntire, *Supt*.Youngstown, O.
Toledo Div.: Thos. Headden, *Jr., Supt*.Cleveland, O.
J. M. Sanborn, *M. M.*.....Norwalk, O.
W. O. Smith, *M. C. B.*.....Norwalk, O.
Mich. Divs.: J. E. Curtis, *Supt*.....Detroit, Mich.
Det. Brs.: T. J. Charlesworth, *Supt*.Detroit, Mich.
Lansing, Ypsilanti & Ft. Wayne Divs.:
W. H. Canif, *Supt*.....Hillsdale, Mich.
Western Div.: A. G. Amsden, *Supt*.....Chicago, Ill.
W. L. Gilmore, *M. M.*.....Chicago, Ill.
Frank O. Bray, *M. C. B.*.....Adrian, Mich.
Gr. Rap. Br.: M. E. Wattles, *Supt*.Kalamazoo, Mich.
Lake Tahoe R. R.....3 g. 10 m. 3 lo. 40 cars.
D. L. Bliss, *Gen. Man*.....Carson, Nev.
John T. Rogers, *Gen. Supt*.....Carson, Nev.
M. M......Carson, Nev.
Leavenworth, Topeka & Sou. W'n Ry. (*See A. T. & S. F.*)
Lebanon Springs R. R.....4-8½ g. 58 m. 5 lo. 44 c.
W. C. Alsbyne, *Gen. Man*.....Albany, N. Y.
W. H. Hawkins, *Pur. Agt*.....Albany, N. Y.
Geo. Tefft, *M. M.*.....Chatham, N. Y.
Lehigh Valley R. R.....4-8½ g. 495 m. 309 lo. 9,958 c.
H. S. Goodwin, *Gen. Supt*.....Bethlehem, Pa.
W. C. Alderson, *Pur. Agt*.....Philadelphia, Pa.
John I. Kinsey, *M. M.*.....Packerton, Pa.
John S. Lentz, *M. C. B.*.....Packerton, Pa.
Jas. W. Donnelly, *Supt*.Penn Anboy, N. J.
Coal Rds.: J. I. Blakeslee, *Supt*.Manch. Chunk, Pa.
D. Clark, *M. M.*.....Hazleton, Pa.
John Campbell, *M. M.*.....Hazleton, Pa.
B. M. Div.: A. G. Brodhead, *S.* Manch. Chunk, Pa.
P. Hofecker, *M. M.*.....Weatherly, Pa.
Wy. Div.: A. Mitchell, *S. & M. M.*Wilkesbarre, Pa.
Pa. & N. Y.: and Geneva, Ithaca & Sayre R. Rs.
Wm. Stevenson, *Gen. Supt*.....Sayre, Pa.
J. N. Weaver, *M. M.*.....Sayre, Pa.
John S. Lentz, *M. C. B.*.....Packerton, Pa.
Lehigh & Hudson River Ry. 4-8½ g. 63 m. 30 lo. 950 c.
Grinnell Burt, *Gen Man*.....Warwick, N. Y
N. L. Furman, *Supt*.....Warwick, N. Y.
John Sayre, *Pur. Agt*.....Warwick, N. Y.
S. Mills, *M. M.*.....Warwick, N. Y.
Lehigh & Lackawanna and Lehigh & Susquehanna R. Rs. (*See Phil. & Read.; N. J. Cen. Div.*)
Levis & Kennebec R. R.....(*See Grand Trunk.*)
Litchfield, Carrollton & Western R. R. 4-8½ g. 22 m.
H. C. Carroll, *Prest. & G. Man*.Carrollton, Ill.
Ligonier Valley R. R.....4-8½ g. 17 m. 0 lo. 4 cars.
Thos. A. Mellon, *Gen. Manager*.....Pittsburg, Pa.
Geo. Senft, *Supt. & M. M.*.....Latrobe, Pa.
Little Miami R. R. (*See Penna. Co.'s Rds.*) (*8*) *Div.*)
Little Rock, Miss. River & Texas Ry.
4-8½ g. 170 m. 10 lo. 258 cars.
H. Wood, *Gen. Man*.....Little Rock, Ark.
A. Lister, *Gen. Supt*.....Little Rock, Ark.
F. Hufsmith, *M. M. & C. B.*.....Argents, Ark.
Little Rock & Fort Smith. 4-8½ g. 170 m. 13 lo. 300 c
Hy. Wood, *Gen. Man*.....Little Rock, Ark.
E. A. Lister, *Supt*.....Little Rock, Ark.
F. Hufsmith, *M. M. & M. C. B.*.....Argents, Ark.
Little Saw Mill Run R. R. 3 & 4-8½ g. 8 m. 4 lo. 327 c.
J. Hardley, *Gen. Man*.....Banksville, Pa.
Long Island R. R.....4-8½ g. 352 m. 95 lo. 5,000 cars.
I. D. Barton, *Gen. Supt*. Long Island City, N. Y.
Seth Norton, *Pur. Agt*. Long Island City, N. Y.
C. A. Thompson, *M. M.* Long Island City, N. Y.
Longview & Sabine Valley R. R. (*See Gal. Sab. & St. L.*)
Louisville & N. R. R. (*See Ohio, Ky. & Ind. Rys.*)
Louisville, Cin. & Lexington R. R. (*See Louis. & N.*)
Louis., Evans. & St. L. Ry. 4-8½ g. 254 m. 16 lo. 1,050 c.
Geo. T. Evans, *Rec*.....Louisville, Ky.
C. F. Dalton, *Gen. Supt*.....Louisville, Ky.
C. F. Bodman, *M. M.*.....Louisville, Ky.
Louisville, New Albany & Chicago Ry.
4-8½ g. 170 miles. 3,700 cars.
John B. Carson, *Gen. Supt*.....Chicago, Ill.
T. L. Dunn, *Gen. Supt*.....Chicago, Ill.
H. D. Nourse, *Pur. Agt*.....Chicago, Ill.
Josiah Bettis, *M. M. & C. B.*.New Albany, Ind.
C. C. F. Bent, *Supt*.....Lafayette, Ind.
Louisville, New Orleans & Tex. Ry. 450 m. 19 lo. 1,000 c.
Jas. M. Edwards, *Gen. Man*.....Memphis, Tenn.
E. B. Anderson, *M. M. & C. B.*.....Memphis, Tenn.
John Bradley, *Div. Supt*.....New Orleans, La.
No. Div.: O. J. Birdsong.....Memphis, Tenn.
Louisville & Nashville R. R.
4 g. 2,186 m. 380 lo. 12,197 cars.
Reuben Wells, *Gen. Man*.....Louisville, Ky.
Geo. F. Evans, *Supt*.....Louisville, Ky.
P. T. Hudson, *Pur. Agt*.....Louisville, Ky.
Reuben Wells, *Supt. Mach*.....Louisville, Ky.
Louisv., Cin. & Lex. Div.:
J. G. Metcalf, *Supt. Trans*.....Louisville, Ky.
P. Leeds, *M. M.*.....Louisville, Ky.
J. W. Luttrell, *M. M.*.....Louisville, Ky.
J. G. Clifford, *M. M.*(2d & C. Div.) Bowling Green, Ky.
Henderson Div.: J. Geddes, *Supt*.Henderson, Ky.
W. F. Pike, *M. M.*.....Nashville, Tenn.
Nash. & D. Div.: J. Geddes, *Supt*.Nashville, Tenn.
S. & N. A. Div.: Levi Hedge, *Supt*.Birmingham, Ala.
C. W. White, *M. M.*.....Birmingham, Ala.
Mob. & M.: S. Div. Pens. & Sel.: St. & Mont. R. Rs.:
B. C. Epperson, *Supt*.....Montgomery, Ala.
J. N. Hall, *M. M.*(Mont. Shops).Montgomery, Ala.
N. O. Div.: O. M. Dunn, *Supt*.....New Orleans, La.
Wm. Adair, *M. M.*.....Mobile, Ala.
Memp. Div.: W. Colcamp, *Supt*.Memphis, Tenn.
J. V. Slusser, *M. M.*.....Memphis, Tenn.
St. L. Div.: C. O. Parker, *Supt*. Mo. tgomery, Ala.
Thos. Walsh, *M. M.*.....Vernon, Ill.
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E. C. Sanmarsh, *Supt*.....Pensacola, Fla.
W. D. Robb, *M. M.*.....Pensacola, Fla.
Louisville & Wadley R. R.....5 g. 10 m. 1 lo. 5 c.
J. H. Wilkins, *Supt. & Pur. Agt*.Louisville, Ga.

M

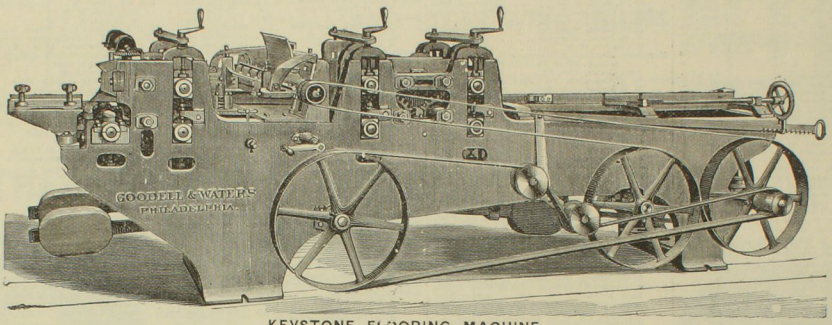
Macon & Brunswick R. R.
(*See E. Tenn., Vir. & Ga.; At. & Gu. Divs.*)
Maine Central R. R.....4-8½ g. 525 m. 82 lo. 2,168 c.
Payson Tucker, *Gen. Man*.....Portland, Me.
Amos Pillsbury, *M. M.*.....Waterville, Me.
C. H. Webster, *M. C. B.*.....Augusta, Me.
Eastern Maine.....3 g. 19 m. 2 lo. 40 c.
L. L. Lincoln, *Supt*.....Portland, Me.
Manchester & Keene R. R. 4-8½ g. 30 m. (*See Concord.*)
Manchester & Lawrence R. R.....(*See Concord.*)
Manchester & North Weare R. R.....(*See Concord.*)
Manhattan Ry.....4-8½ g. 32 m. 228 lo. 652 pass. c.
Frank W. Hain, *Gen. Man*.....New York, N. Y.
W. J. Goundie, *Supt. Trans*.....New York, N. Y.
T. W. Peeples, *M. M.*.....New York, N. Y.
E. A. Hegeler, *M. C. B.*.....New York, N. Y.
Manhattan, Alma & Burlingame Ry. (*See A., T. & S. F.*)
Manitoba Southwestern Colonization Ry.
4-8½ g. 52 m. 3 lo. 125 cars.
J. M. Eagan, *V. Pres*.....Winnipeg, Man.
T. T. Reed, *M. M.*.....Winnipeg, Man.
Marietta & Cincinnati R. R. (*See Cin., Wash. & Balt.*)
Marietta & North Georgia R. R. 3 g. 70 m. 4 lo. 45 c.
J. B. Glover, *Supt. & Trans*.....Marietta, Ga.
W. R. Power, *Pur. Agt*.....Marietta, Ga.
J. Chester, *M. M.*.....Marietta, Ga.
Marquette, Houghton & Ontonagon R. R.
4-8½ g. 100 m. 42 lo. 2,530 cars.
John Horning, *Gen. Man*.....Marquette, Mich.
W. A. Thompson, *Ass't Supt*.Marquette, Mich.
M. B. McVee, *Pur. Agt*.....Marquette, Mich.
W. A. Mahan, *M. M.*.....Marquette, Mich.
H. D. Lyons, *M. C. B.*.....Marquette, Mich.
Maryland Central R. R.....3 g. 27 m. 2 lo. 23 cars.
S. G. Boyd, *Supt*.....Baltimore, Md.
Marquette & Western.....4-8½ g. 55 m. 10 l. 500 c.
D. McCool, *Gen. Supt*.....Marquette, Mich.
W. J. Tench, *Pur. Agt*.....Marquette, Mich.
J. H. Wood, *M. M.*.....Marquette, Mich.
Massachusetts Central R. R. 4-8½ g. 48 m. 5 l. 51 c.
E. S. Allen, *Supt & Pur. Agt*.....Boston, Mass.
E. A. Walker, *M. M.*.....Boston, Mass.
McComb, Deshler & Toledo R. R.
(*See Cin., Hock. & Day.; D. & M. Div.*
Meadville Ry. (*See Penna. Co.'s Rds.*) (*2*) *Div.*)
Memphis & Charleston R. R. (*See E. Tenn. Va. & Ga.*
Memphis & Lit. Rock R. R.....5 g. 13 m. 1 lo. 5 c.
R. Fink, *G. Man. & P. A.*.....Little Rock, Ark.
H. G. Fleming, *Gen. Supt*.....Memphis, Tenn.
Thos. Rennell, *M. M.*.....Argenta, Ark.
T. Brunell, *M. C. B.*.....Argenta, Ark.
Mexican Ry.....4-8½ g. 293 m. 42 lo. 1,000 c.
E. E. Jackson, *Gen. Man*.....Mexico, Mex.
Mexican Central Ry. 4-8½ g. 1,224 m. 104 lo. 3,000 c.
Theo. Nickers *m, Pur. Agt*.....Boston, Mass.
D. B. Robinson, *Gen. Man*.....City of Mexico.
D. MacKenzie, *Gen. Supt*.....City of Mexico.
F. W. Johnstone, *Supt. M. P. & M.*City of Mexico.
W. H. Bancroft, *Gen. Agt*.....City of Mexico.
G. T. Jarvis, *Div. Supt*.....City of Mexico.
A. Smith, *Div. Supt*.....Silao, Mex.
Wm. Davis, *Div. Supt*.....Jimulco, Mex.
R. E. Comfort, *Div. Supt*.Paso del Norte, Mex.
R. S. Simpson, *M. M.*.....City of Mexico.
A. Hendee, *M. M.*.....Calera, Mex.
C. F. Stewart, *M. M.*.....Silao, Mex.
H. J. Wallace, *M. M.*.....Jimulco, Mex.
J. G. McCune, *M. M.*.....Chihuahua, Mex.
Tampico Div: E. A. Whorf, *Supt*.Tampico, Mex.
San Bias Div.: C. E. Payne, *Supt*.San Blas, Mex.
Mexican National Ry. 3 g. 766 m. 50 lo. 1,283 c.
Northern General Division:
C. A. Merriam, *Gen. Supt*.....Laredo, Tex.
F. W. Baldwin, *Asst. Gen. Supt*.Laredo, Tex.
John Grace, *M. M.*.....Monterey, Mex.
T. Milan, *M. M.*.....Corpus Christi, Tex.
Metaneras, Div :
W. W. Mayberry, *Asst. Supt*.Brownsville, Tex.
Galveston Div.:
E. E. Quinn, *Asst. Supt*.....Galveston, Tex.
Southern General Division:
W. F. Lewis, *Supt*.....Mexico, Mex
R. C. Peebles, *Asst. Supt*.....Mexico, Mex
J. M. Winslow, *M. M.*.....Mexico, Mex
Zacatecas Div.:
C. Langrand, *Manager*.....Zacatecas, Mex.
Michigan Cen. R. R. 4-8½ g. 1,485 m. 1,000 lo. 30,000 c.
H. B. Ledyard, *Pres. & Gen. Man*.Detroit, Mich.
E. C. Brown, *Gen. Supt*.....Detroit, Mich.
Robert Miller, *Asst. Gen. Supt*.Detroit, Mich.
Allan Bourn, *Pur. Agt*.....Detroit, Mich.
S. H. Ingersoll, *M. M.*.....Jackson, Mich.
(1) Lines West of Detroit River:
E. C. Brown, *Gen. Supt*.....Detroit, Mich.
East. Dpv.: D. S. Stinchfield, *Supt*.Detroit, Mich.
Bay City, Saginaw & Mackinaw Divisions:
W. A. Vaughan, *Supt*.....Bay City, Mich.
C. E. Smart, *M. M.*.....Bay City, Mich.
Main Line: Gr. Rap.; So. Bend; and So. Ho. Divs.:
C. B. Bush, *Supt*.....Jackson, Mich.
W'n Div.: R. H. L. Hommedieu, *Supt*.C. cago, Ill.
(2) Lines East of Detroit River:
J. E. Morford, *Supt*.....St. Thomas, Ont.
A. Bull, *M. M.*.....St. Thomas, Ont.
Robt. Potts, *M. C. B.*.....St. Thomas, Ont.
Michigan & Ohio.....
Luther Allen, *Supt*.....Toledo, O
W. L. Webb, *Pur. Agt*.....Toledo, O.
D. J. Durrell, *M. M.*.....Marshall, Mich.
Middleburg & Schoharie; and Schoharie Valley R. Rs. 4-8½ g. 11 m. 2 lo. 6 cars.
P. S. Danforth, *Gen. Supt*.....Middleburg, N. Y.
Midland of Canada.....(*See Grand Trunk.*)
Midland No. Carolina Ry.....5 g. 16 m. 9 lo. 82 cars.
Atlantic & North Carolina R. R.
John D. Whitford, *Gen. Man*.....Newbern, N. C.
J. A. Bryan, *Supt*.....Newbern, N. C.
D. J. Sprague, *Pur. Agt*.....New York, N. Y.
B. Manly, *Supt. of Mach*.....Newbern, N. C.
Milford & Woonsocket.
W. W. Jencks, *Supt*.....Milford, Mass.
Milton & Sutherlin.....(*Spec. ky Rich. & Danville.*)
Milwaukee, Lake Shore & Western Ry.
4-8½ g. 370 m. 45 lo. 1,536 cars.
H. G. H. Kelley, *Gen. Supt*.....Milwaukee, Wis
J. Donahue, *Supt*.....Milwaukee, Wis
John Hickey, *M. M.*.....Ledyard, Wis.
Milwaukee & Northern and Wisconsin & Michigan R. Rs. 4-8½ g. 228 m. 24 l. 705 cars.
C. F. Dutton, *Gen. Supt*.....Milwaukee, Wis.
N. S. Kimball, *M. M.*.....Ft. Howard, Wis.
Mineral Range R. R.....3 g. 13 m. 4 lo. 43 cars.
Chas. E. Holland, *Pr. & Supt. Trans*.Hancock, Mich.
W. H. Carr, *Pur. Agt*.....Hancock, Mich.
T. J. Sheldon, *M. M. & C. B.*.....Hancock, Mich.
Minneapolis, Lyndale & Minnetonka Ry.
3 g. 25 miles 4 motors 1 lo. 35 cars.
William McMillan, *Gen. Man*.....Minneapolis, Minn
T. W. Heintzeman, *M. M.*.....Minneapolis, Minn.
Minneapolis, St. Marie & Atlantic Ry.
4-8½ g. 45 m.
W. Rich, *Supt*.....Minneapolis, Minn.
Missisquoi R. R.....Newport, N. I.
W. C. Smith, *Man*.....St. Albans, Vt.
Mississippi Barre Axe Boeufs & Lake R. R.
29 miles.
M. R. Steelman, *Supt*.....New Orleans, La.
Mississippi & Tenn. R. R. 4-8½ g. 101 m. 12 lo. 194 c.
M. Burke, *Gen. Supt*.....Memphis, Tenn.
J. C. Ramsey, *M. M.*.....Memphis, Tenn.
S. J. Bolton, *M. C. B.*.....Memphis, Tenn.
Missouri, Kansas & Texas Ry. (*See Mo. Pac.; (2) Div.*)
Missouri Pacific Ry. (Leased and operated lines.)
4-8½ g. 6,625 m. 697 lo. 19,748 cars.
H. M. Boxe, *Sup't. Pres*.....St. Louis, Mo.
R. B. Lyle, *Pur. Agt*.....St. Louis, Mo.
(1), (2) and (3) Divs.:
John Hewitt, *supt. M. P. & M.*...St. Louis, Mo.
John Hodge, *Supt. Car Dep*.....St. Louis, Mo.
Frank Howard, *Asst. Supt. C. D.*.Marshall, Tex.
(4), (5) and (6) Divs.:
O. A. Hayne *s, S. M. P. & M.*.....Marshall, Tex.
(1) Missouri Pacific Ry. 1,078 m. 155 lo. 4,218 cars.
A. M. Hagar, *Supt*.....Sedalia, Mo.
H. Busby, *M. M.*.....Sedalia, Mo.
W'n Div.: A. M. Hagar, *Supt*.....Sedalia, Mo.
(2) Mo., Kan. & Tex. Ry. 1,308 m. 140 lo. 4,948 cars.
S. Trift, *Asst. Supt. Car Dep*.....Sedalia, Mo.
J. B. Vandyne, *Supt*.....Parsons, Kan.
W. Haines, *M. M.*.....Parsons, Kan.
(3) Central Branch Un. Pac. R. R. 388 m. 30 lo. 500 c.
W. W. Fagan, *Supt*.....Atchison, Kan.
H. W. Faries, *M. M.*.....Atchison, Kan.
J. W. Blackburn, *A. Supt. Car D.*.Atchison, Kan.
(4) St. L., I. M. & So'n Ry. 905 m. 138 lo. 4,198 c.
Wm. Kerrigan, *Supt*.....St. Louis, Mo.
St. Louis Div.: W. H. Harris, *M. M.*De Soto, Mo.
Ark. Div.:.....Little Rock, Ark.
R. M. Richardson, *M. M.*.....Little Rock, Ark.
(5) Int. & Gt. No. Ry. 1,000 m. 100 lo. 3,000 c.
W. S. Morris, *M. M.*.....Palestine, Tex.
(6) Tex. & Pac. Ry.....*Supt*.....Marshall, Tex.
E. N. O. & Tex. Cent. Divs.:
Geo. Dimick, *Supt*.....Marshall, Tex.
E. A. Hegeler, *M. M.*.....Marshall, Tex.
E. R. Smith, *M. M. & M. C. B.*.N. Orleans, La.
Rio Grande Div.:
L. L. Butt, *M. M.*.....Big Springs, Tex.
J. K. Lape, *M. M.*.....Big Springs, Tex.
Mobile & Ohio R. R. 4-8½ g. Frank R. R. 5 g. 50 m. 2 lo. 23 c.
Wm. H. Pratt, *Trustee*.....Mobile, Ala.
Mobile & Girard R. R.....5 g. 84 m. 7 lo. 112 cars.
W. L. Jarvis, *Gen. Supt*.....Columbus, Ga.
J. C. Albrecht, *M. M.*.....Columbus, Ga.
A. C. Dyer, *M. C. B.*.....Columbus, Ga.
Mobile & Montgomery Ry.....(*See Louis. & Nash.*)
Mobile & Northwestern R. R. 3 g. 31 m. 2 lo. 16 c.
E. A. Hagerty, *M. M.*.....Hamilton, Miss.
Mobile & Ohio R. R.....5 g. 528 m. 75 lo. 1,353 cars.
J. M. Hudson, *V. P. & Gen. Man*.Mobile, Ala.
J. G. Motley, *Gen. Supt*.....Mobile, Ala.
F. Jordan, *Pur. Agt*.....Mobile, Ala.
M. T. Jones, *M. M.*.....Whistler, Ala.
J. T. Booth, *M. C. B.*.....Whistler, Ala.
So'n Div.: J. G. Motley, *Supt*.....Mobile, Ala.
L. J. Morris, *M. M.*.....Mobile, Ala.
No'n Div.: E. S. Hosford, *Supt*.Jackson, Tenn.
H. G. Goode, *M. M.*.....Jackson, Tenn.
Mobile & Spring Hill R. R.....5-2 g. 8 m. 1 lo. 2 cars.
T. Fillyaw, *Manager*.....Mobile, Ala.
Moline & Southeastern R. R. 3-6 g. 8 m. 0 lo. 26 c.
Hartsell Bridges, *Gen. Man*.....Coal Valley, Ill.
Mont. Ala. & Memphis Ry.....4-9 g. 21 m. 2 lo. 4 cars.
G. B. Wiestling, *Supt. & P. A.*.....Mont. Alto, Pa.
Montgomery & Eufaula Ry. (*See Cen. of Ga.*)
Montpelier & Wells River R. R. 3 g. 20 m. 0 lo. 15 cars.
S. D. Hubbard, *Jr., Gen. Man*.Montgomery, Ala.
Montour R. R.....4-8½ g. 38 m. 3 lo. 190 cars.
C. R. Brown, *Supt. & Pur. Agt*.....Imperial, Pa.
Henry Newman, *M. C. B.*.....Imperial, Pa.
Wells Riv. R. R. 4-8½ g. 28 m. 3 lo. 85 c.
W. A. Stowell, *Supt*.....Montpelier, Vt.
Montreal & Boston Ry.....(*See Passumpsic.*)
Montreal & Sorel Ry.....4-8½ g. 30 m. 0 lo. 35 c.
C. S. Armstrong, *G. M. & Pur. Agt*.Sorel, Que.
J. F. Armstrong, *Gen. Supt*.....Sorel, Que.
G. W. Pangborn, *M. M.*.....Sorel, Que.
Montrose R. R.....3 g. 28 m. 0 lo. 24 cars.
T. G. Walter. *Gen. Supt*.....Tunkhannock, Pa.
Morgan's Louis. & Tex. R. R. 4-8½ g. 260 m. 46 l. 1,339 c.
J. Kruttschnitt, *Gen. Man*.....New Orleans, La.
C. Trumpy, *Pur. Agt*.....New Orleans, La.
J. D. Neal, *M. M.*.....Algiers, La.
Jno. Hildebrand, *M. C. B.*.....Algiers, La.
Mount Washington R. R.....5-3 g. 3 m. 0 lo. 6 cars.
Jas. M. Hudson, *Gen Man*.....Franklin, N. H.
Muncy Creek Ry. (*See Wmspt. & No. Br.*)

N

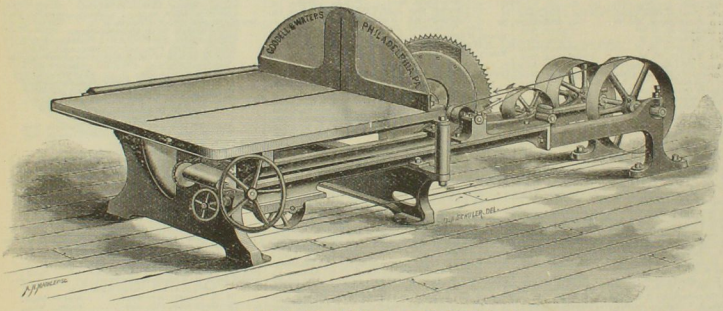
Nantasket Beach R. R. 4-8½ g. 6 m. 5 lo. 25 c.
George L. Keyes, *Gen. Supt*.....Boston, Mass.
Naugatuck R. R.....4-8½ g. 62 m. 17 lo. 547 cars.
Geo. W. Beach, *Supt*.....Bridgeport, Conn.
H. A. Bishop, *Pur. Agt*.....Bridgeport, Conn.
Hy. D. Beach, *Supt. R. S.*.....Bridgeport, Conn.
Nepanee, Tamworth & Quebec Ry. In progress.
Eli W. Bradbun, *Man. Dir.*.....Deseronto, Ont
R. C. Carter, *Sec*.....Deseronto, Ont.
Narragansett Pier R. R. 4-8½ g. 8 m. 2 lo. 11 c.
C. E. Spencer, *Pur. Agt & Financial R.*
Nashua & Rochester R. R.....(*See Wor. & Nash.*)
Nashville, Chattanooga & St. Louis Ry.
4-8½ g. 257 m. 87 lo. 1,978 cars.
J. W. Thomas, *G. Man. & P. Agt*.Nashville, Tenn.
M. J. C. Weaver, *Gen. Supt*.....Nashville, Tenn.
James Cullen, *M. M. & C. B.*.....Nashville, Tenn.
Nashville & Florence R. R.....5 g. 20 m.
W. Craik, *Supt*.....Columbia, Tenn.
Natchez, Jackson & Col. R. R. 3-6 g. 100 m. 7 lo. 92 c.
Wm. Hall, *Supt*.....Natchez, Miss.
National Car Company.....4,000 Freight cars.
L. Mills, *Pres*.....Boston, Mass.
E. Stevens Cunningham, *Sec. & Tr. N. Y. Office*.
John B. Fletcher, *Supt*.....St. Albans, Vt.
Nebraska, Dakota & Minneapolis R. R. 4-8½ g. 16 m.
H. M. Clarke, *Gen. Man*.....Gilroy, Minn.
C. H. Malin, *Gen. Supt*.....Girard, Kan.
New Brunswick R. R.....4-8½ g. 119 m. 20 lo. 1,000 c.
E. R. Burpee, *Gen. Man*.....Woodstock, N. B.
Jesse Hartley, *Gen. Supt*.....Gibson, N. B.
T. N. Burpee, *M. C. B.*.....McAdam Junc., N. B.
J. J. Seely, *Pur. Agt*.....Woodstock, N. B.
Thos. Andrews, *M. M.*.....St. Andrew's, N. B.
G. Houlton, *M. C. B.*.....St. Andrew's, N. B.
New Brunswick Ry.....(*See New Brun.*)
Newburgh, Dutchess & Conn. R. R.
C. L. Kimball, *Supt. & P. Agt*.Matteawan, N. Y.
New Castle R. R.....3 g. 5 m. 0 lo. 2 cars.
Geo. Pearson, *Gen. Man*.....New Castle, Pa.
New Haven & Derby R. R. 4-8½ g. 13 m. 0 lo. 70 c.
E. S. Quintard, *Supt*.....New Haven, Conn.
New Haven & Northampton. 4-8½ g. 62 m. 0 lo. 200 c.
Henry Fox, *M. M.*.....New Haven, Ct.
John Sweeney, *Pur. Agt*.....New Haven, Ct.
New Jersey & New York Ry. 4-8½ g. 37 m. 0 lo. 40 c.
J. D. Hasbrouck, *Gen. Man*.Jersey City, N. J.
J. S. Drake, *Supt. of M. P.*.....Hillsdale, N. J.
L. B. Van Wagonen, *M. C. B.*.....Hillsdale, N. J.
N. J. Southern R. R. (*See Cent. of N. J.*)
New London Northern R. R.....(*See Central Ver.*)
New Orl. and N. Rouge, Works & Memphis.
Jas. M. Edwards, *Gen. Man*.New Orleans, La.
John Bradley, *Supt*.....New Orleans, La.
New Orleans Pacific Ry.....(*See Mo. Pac.*) (*6*) *Div.*)
New Orleans & Carrollton R. R.
4-5 g. 15 m. 13 lo. 70 cars.
C. V. Hallo, *Supt*.....New Orleans, La.
John Dahmer, *M. M.*.....New Orleans, La.
Jas. Thomas, *M. C. B.*.....New Orleans, La.
New Orleans & Mobile R. R.....(*See Louis. & Nash.*)
N. O. & Northeastern R. R.....(*See Cin., N. O. & Tex. Pac.*)
New Orleans & Selma R. R.....5 g. 31 m. 1 lo. 6 cars.
L. B. Schofield, *Supt*.....Selma, Ala.
Newport & Richford R. R.....4-8½ g. 22 m.
Theo. Warren, *Supt*.....Newport, N. I.
Nevada Central Ry.....(*See Union Pac.*) (*7 Div.*)
Nevada County N. G. R. R. 3 g. 13 m. 0 lo. 40 cars.
John F. Kidder, *Supt*.....Grass Valley, Cal.
Jas. McCormick, *M. M. & C. B.*Grass Valley, Cal.
Nevada & Oregon R. R.....3 g. 30 m. 25 cars.
H. W. Bald.....Reno, Nev.
N. Y. Central & Hudson River R.R.
4-8½ g. 983 m. 676 lo. 25,161 cars.
J. M. Toucey, *Gen. Supt*.....New York, N. Y.
Chas. Reed, *Pur. Agt*.....New York, N. Y.
Wm. Buchanan, *Supt. M. P. and R. Stock*.
New York, N. Y.
N. Y. & Har. Div.: C. M. Bissell, *Supt*. do.
P. McQ. Gibson, *M. M.*.....New York, N. Y.
Hud. Riv. Div.: C. M. Bissell, *Supt*.N. York, N. Y.
W. H. Wolfrath, *M. C. B.*.....New York, N. Y.
E'n Div.: Zenas C. Priest, *Supt*.Little Falls, N. Y.
John Ortton, *M. M.*.....West Albany, N. Y.
L. Packard, *M. C. B.*.....West Albany, N. Y.
W'n Div.: Geo. H. Burrows, *Supt*.....Buffalo, N. Y.
S. L. White, *M. M.*.....Syracuse, N. Y.
Amos Gould, *M. M.*.....E. Buffalo, N. Y.
E. Chamberlain, *M. C. B.*.....E. Buffalo, N. Y.
Peter Smith, *M. C. B.*.....E. Rochester, N. Y.
Ed. Donahy, *M. C. B.*.....Niagara Falls, N. Y.
N. Y. Chic. & St. L. Ry. 4-8½ g. 575 m. 11 lo. 3,618 c.
Lewis Williams, *Gen. Man*.....Cleveland, O.
Jno. Mackenzie, *Supt. M. P.*.....Cleveland, O.
Eas'n Div.: G. H. Kimball, *Supt*.....Cleveland, O.
E. A. Haines, *M. M.*.....Conneaut, O.
West'n Div.: A. H. Evans, *Supt*.....Conneaut, O.
Jas. Eckford, *M. M.*.....Bellevue, O.
New York City & N. Railway.....4-8½ g. 28 m. 17 lo. 308 c.
Frank S. Gannon, *Gen. Supt*.High Bridge, N. Y.
Thos. Millen, *M. M.*.....High Bridge, N. Y.
New York, Lackawanna & W'n Ry.(*See Del., L. & W.*)
New York, Lake Erie & Western R. R.
E. S. Bowen, *Rec*.....New York, N. Y.
N. Y., L. E. & W. Ry. 4-8½ g. 1,073 m. 576 lo. 30,553 c.
H. Thomas, *Gen. Supt*.....Jersey City, N. J.
J. A. Hardenburgh, *Pur. Agt*.New York, N. Y.
F. M. Wilder, *Supt. M. P. & M.*.Susqueh'a, Pa.
E'n Div. C. E. Hill, *Supt*.....Jersey City, N. J.
J. H. Vreeland, *M. M.*.....Jersey City, N. J.
S. E. Mitchell, *M. C. B.*.....Jersey City, N. J.
Del. Div.: E. Van Etten, *Supt*.Port Jervis, N. Y.
Jas. Van Vechten, *M. M. & C. B.*Ft. Jervis, N. Y.
Susq. Div.: Binney, *Supt*.....Binney, N. Y.
U. Blackburn, *M. M.*.....Susquehanna, Pa.
B. D. Gardner, *M. C. B.*.....Elmira, N. Y.
Buf. & R. Divs.: W. J. Murphy, *Supt*.....Rochester, N. Y.
W. Wilder, *M. M.*.....Buffalo, N. Y.
B. & S. W. Div.: C. A. Brunn, *Supt*.....do.
W'n Div.: W. H. Coffin, *Supt*.Hornellsville, N. Y.
J. H. Hawthorne, *M. M.*.....Hornellsville, N. Y.
N. Y. & Greenwood L'k Ry. 4-8½ g. 44 m. 8 lo. 53 c.
Stephen Smith, *Supt*.....Jersey City, N. J.
F. E. Stinard, *M. M.*.....Jersey City, N. J.
N. Y. & Long Island R. R. 4-8½ g. 565 m. 271 lo. 7,794 c.
S. M. Felton, *Jr., Gen. Man*.....Cleveland, Ohio
J. M. Ferris, *

Goodell & Waters

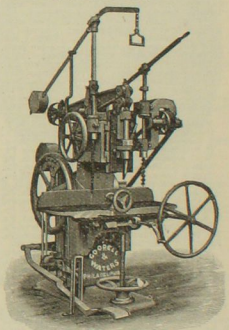
PHILADELPHIA, PA.



KEYSTONE FLOORING MACHINE.



LARGE TRAVERSE CUT-OFF SAW.



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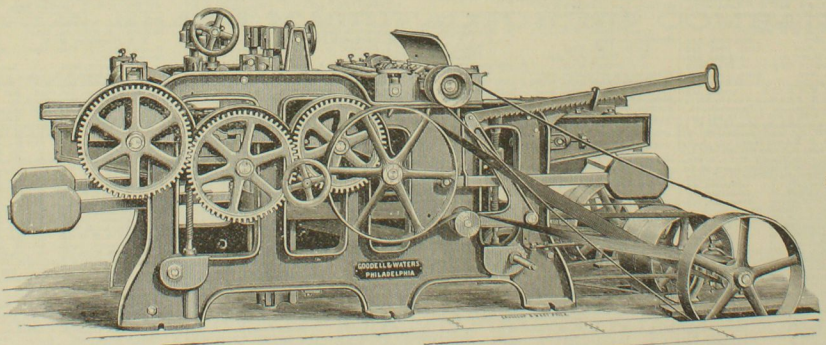

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F. Greene, *A. Supt*.....Mandan, Dak.
3d Gr. Div.: S. R. Ainslie, *Supt*...Glenpike, Mont.
S. L. Bean, *M. M*.....Glendive, Mont.
J. C. Munro, *M. M*.....Livingston, Mont.
(2) Wis Div.: F. M. Buckley, *Asst. Gen. Man.*
New Tacoma, W. T.
H. D. Sanborn, *P. Agt*.....Portland, Ore.
W. T. Small, *A. S. Mach*.....Portland, Ore.
4th Gr. Div.: J. R. Cable, *Supt*.....Missoula, Mont.
F. P. Weymouth, *Supt*.....Sprague, W. T.
Wm. Garlock, *M. M*.....Missoula, Mont.
J. Evans, *M. M*.....Spokane, W. T.
5th Gr. Div.: Otis Sprague, *Supt*.....Tacoma, W. T.
H. H. Warner, *M. M*.....Tacoma, W. T.
Northern & North-W'n R'ys: A. 4-8¼ g. 378 m. 50 to 65 lbs.
James Webster, *Supt*.....Toronto, Can.
W. C. Schreiber, *Pur. Agt*.....Toronto, Can.
P. Clarke *M. M*.....Toronto Can.
Northern & Western Ry.....4-8½ g. 50 m.
J. B. Snowball, *Mas.*.....Chatham, N. B.
Nova Scotia Ry.....4-8½ g. 79 m. 9 to 208 c.
C. A. Scott, *Gen. Man*.....New Glasgow, N. S.
M. F. Punch, *M. M*.....New Glasgow, N. S.

Ogdensburg & Lake Champlain R. R.
4-8½ g. 130 m. 33 to 1,694 cars.
A. A. Gaddis, *Gen. Man.*.....Ogdensburg, N. Y
E. B. Burnham, *Pur. Agt*.....Ogdensburg, N. Y.
Abr. Klohs, *M. M*.....Malone, N. Y.
H. S. Leach, *Master Builder*.Ogdensburg, N. Y.
Ohio Central R. R. 4-8½ g. 325 m. 46 lo. 4,760 cars.
John E. Martin, *Rec*.....Bucyrus, O.
T. M. Feelar, *Supt*.....Bucyrus, O
F. W. Stewart, *Pur. Agt*.....Toledo, O.
H. S. Morgan, *M. M. & C. B*.....Bucyrus, O.
Ohio River R. R.....4-9 g. (in progress).
C. L. Williams, *Asst. Supt*.Parkersburg, W. Va.
S. Litchworth, *M. M*.....Parkersburg, W. Va.
Ohio Southern R. R.....(*See Ind., Bloom. & W'n.*)
Ohio & Mississippi Ry. 4-8½ g. 616 m. 110 lo. 7,501 cars.
W. W. Peabody, *Pres. & Gen. Man.*Cincinnati, O.
O. E. Atwood, *Pur. Agt*.....Cincinnati, O.
J. H. Setchel, *Gen. M. M*.....Cincinnati, O.
Cin. Div.: C. B. Cole, *Supt*.....Seymour, Ind.
J. P. Coulter, *Gen. M. C. B*.....Seymour, Ind.
E. E. Jenks, *A. Gen. For*.....Seymour, Ind.
W. L. Hoffecker, *M. M*.....Vincennes, Ind.
A. N. Bradley, *M. C. B*.....Cochran, Ind.
St. L. & Sp. Div.: C. M. Stanton, Supt.St. Louis, Mo.
J. W. Stokes, *M. M*.....Effingham, Ill.
Louisv. Div.: C. B. Cole, *Supt*.....Louisville, Ky
Oil City & Chicago R. R. *See Buff. & Phil.*)
Old Colony R. R.....4-8½ g. 470 m. 124 lo. 3,327 cars.
J. R. Kendrick, *Gen. Man*.....Boston, Mass.
R. W. Husted, *Pur. Agt*.....Boston, Mass.
Jas. N. Lauder, *Supt. R. S*.....Boston, Mass.
Isaac Stevens, *Jr. & Bridges*.....Boston, Mass.
Main Li. Div.: J. H. French, *Supt*.....Boston, Mass.
F. M. Twombly, *M. M*.....Boston, Mass.
Cape Cod Div.: C. H. Nye, *Supt*.....Hyannis, Mass.
F. M. Twombly, *M. M*.....Boston, Mass.
No. Div.: S. A. Webber, *Supt*.....Fitchburg, Mass.
A. W. Twombly, *M. M*.....Fitchburg, Mass.
Olympia & Chehalis Val. R. R.....3 g. 15 m.
Otis Sprague, *Supt*.....Olympia, W. T.
Oregon Ry. & Navigation Co.
3 & 4-8½ g. 807 m. 70 lo. 1,611 cars.
C. H. Prescott, *P. & Gen. Man.*Portland, Ore.
F. T. Dodge, *Supt.* (Riv. Div.).....Portland, Ore.
H. S. Rowe, *Supt.* (Riv. Div.).....Portland, Ore.
J. M. Drake, *Pur. Agt*.....Portland, Ore.
Goodall, Perkins & Co., *Supt.* (Ocean Div.)
San Francisco, Cal.
C. C. Hobart, *Gen. M. M*.....The Dalles, Ore
F. E. Carlsen, *M. C. B*.....The Dalles, Ore.
Oregon & California R. R. 4-8½ g. 449 m. 43 lo. 626 c.
R. Koehler, *Gen. Man*.....Portland, Ore
J. Brandt, *Gen. Supt*.....Portland, Ore.
W. T. Bodley, *Pur. Agt*.....Portland, Ore.
A. Brandt, *M. M*.....Portland, Ore.
Ottumwa & Kirkville Ry.....4-8½ g. 13 m.
J. A. Kebler, *Supt*.....Ottumwa, Ia.
Owensboro & Nashville R. R.....5 g. & 4-8½ lo. 70 m.
W. M. Newbold, *Supt*.....Owensboro, Ky.
J. T. Edwards, *M. of C. B*.....Owensboro, Ky.
Oxford & Henderson R. R. 4-8½ g. 13 m. 2 lo. 11 c.
James A. White, *Gen. Supt*.....Henderson, N. C.
Thomas C. Lawrence, *M. M*.....Henderson, N. C.

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Pacific Coast Ry.....3 g. 64 m.
J. M. Fillmore, *Manager* San Luis Obispo, Cal.
W. H. Masterman, *M. M. & C. B*.....do.
Painesville & Youngstown R. R. 4-8½ g. 45 m. 7 lo. 300 c.
R. K. Paige, *Rec. & Man.*.....Painesville, O.
C. A. Newcome, *Supt. & M. M*.....Painesville, O.
Panama R. R.....5 g. 48 m. 14 lo. 2,200 cars.
G. A. Burt, *Gen. Supt*.....Aspinwall, U. S. Col.
E. Z. Penfield, *Pur. Agt*.....Aspinwall, U. S. Col.
Jas. Reilly, *M. M*.....Aspinwall, U. S. Col
Passumpsic R. R. 4-8½ g. 128 m. 28 lo. 1,101 cars.
E. Raymond, *Pres. & Pur. Agt*.....St. Johns, Vt.
H. E. Folsom, *Supt*.....Lyndonville, Vt.
L. L. Brigham, *M. M*.....Lyndonville, Vt.
L. F. Woodard, *M. C. B*.....Lyndonville, Vt.
Paw Paw and Toledo & South Haven R. Rds.
3 g. 59 m. 3 lo. 10 c.
John Ibling, *Supt*.....Lawton, Mich.
Peach Bottom R. R.....3 g. 55 m. 3 lo. 20 c.
B. B. Newton, *Supt. & Pur. Agt*.....Oxford, Pa.
E. H. Williams, *M. C. B*.....York, Pa.
W. F. Kirk, *M. M*.....Oxford, Pa.
Pemigewasset Valley R. R. 4-8½ g. 21 m. 2 lo. 127c.
J. Thomas Vose, *Pres*.....Boston, Mass.
Pennsylvania Co.'s R'ys:
4-9 g. 3,222 m. 930 lo. 32,800 cars.
Gen. Divs. (1), (2), (3), (4) and (5).
Wm. A. Baldwin, *Gen. Man*.....Pittsburg, Pa.
John Thomas, *Gen. Supt*.....Pittsburg, Pa.
Wm. Mullins, *Gen. Pur. Agt*.....Pittsburg, Pa.
Joseph Wood, *Supt. M. P*.....Fort Wayne, Ind.
(1) Pittsburg, Ft. Wayne & Chicago R'y.
4-9 g. 468 m. 288 lo. 8,023 cars.
E'n Div.: A. B. Starr, *Supt*.....Allegheny, Pa.
Geo. J. Parkin, *M. M*.....Allegheny, Pa.
D. M. Peppard, *M. M*.....Crestline, O.
W'n Div.: C. D. Law, *Supt*.....Ft. Wayne, Ind.
F. D. Casanave, *M. M*.....Ft. Wayne, Ind.
A. H. Somers, *Supt. Shops*.....Chicago, Ill.
(2) Ashtabula & Pittsburg, and
(3) Erie & Pittsburg R. Rds.
221 m. 20 lo. 1,362 c.
John M. Kimball, *Supt. & Engineer*.....Erie, Pa.
J. A. Wood, *Gen. Pur. Shops*.....Erie, Pa.
(4) Cleveland & Pittsburg R. R. 225 m. 97 lo. 3,594 cars.
R. F. Smith, *Asst. Man*.....Cleveland, O.
Philip Bruner, *Supt*.....Wellsville, O.
W. F. Beardsley, *Asst. M. of Mach. Wellsville, O.*
(5) Nc-W'n Ohio Ry.: J. S. Morris, *Supt*.....Toledo, O.
Pennsylvania R. R. Co.'s R'ys.)
4-9 g. 3,158 m. 1,450 loco. 60,816 cars.
Chas. E. Puch, *Gen. Man*.....Philadelphia, Pa.
Enoch Lewis, *Pur. Agt*.....Philadelphia, Pa.
John Reilly, *Supt. Trans*.....Philadelphia, Pa.
T. N. Ely, *Gen. S. & B*.....Altoona, Pa.
Pennsylvania R. R. Divs.
4-9 g. 1,213 m. 705 lo. 40,819 cars.
S. M. Prevost, *Gen. Supt*.....Altoona, Pa.
Frank L. Sheppard, *Supt. M. P*.. Altoona, Pa.
G. W. Stratton, *M. M*.....Altoona, Pa.
Jno. P. Levan, *Gen. Fore*.....Altoona, Pa.
Phila. Div.: Thos. Gucker, *Supt*.Philadelphia, Pa.
H. D. Garrett, *M. M*.....Philadelphia, Pa.
I. W. Van Houten, *Gen. For*.....W. Phila., Pa.
Schuylkill Riv.:
Jas. Reed, *Supt*.....Reading, Pa.
Mid. Div.: O. E. McClellan, *Supt*.Harrisburg, Pa.
E. L. Camm, *M. M*.....Harrisburg, Pa.
Samuel W. Myers, *Gen. For*.....Harrisburg, Pa.
Altoona Div.: J. B. Hutchinson, *Supt*.....Altoona, Pa.
Pitts. Div.: Robert Pitcairn, *Supt*.....Pittsburg, Pa.
D. O. Shaver, *M. M*.....Pittsburg, Pa.
J. G. Stewart, *Gen. For*.....Pittsburg, Pa.
W. Pa. Div.: A. P. Kirtland, *Supt*.Blairsville, Pa.
Wm. H. Norris, *M. M*.....Blairsville, Pa.
M. H. Falls, *Gen. For*.....Blairsville, Pa.
Fred. Div.: Wilson Brown, *Supt*.....York, Pa.
Tyrone Div.: S. S. Blair, *Supt*.....Tyrone, Pa.
Lew. Div.: Wm. M. Phillips, *Supt*.Lewistown, Pa.
Bed. Div.: R. L. Holliday, *Supt*.....Bedford, Pa.
Monong. Div.: David M. Watts, *Supt*.Pittsburg, Pa.
Wm. Uninger, *M. M*.....Pittsburg, Pa.

(2) United R. Rs. of N. J. Divs. 471 m. 330 lo. 4,041 c.
F. Wolcott Jackson, *Gen. St.* Jersey City, N. J.
H. S. Hayward, *Supt. M. P*.....Jersey City, N. J.
David H. Baker, *Gen. For*.....Jersey City, N. J.
N.Y. Div.: Robt. F. Pettit, *Supt*.Jersey City, N. J.
L. A. Bosdevex, *M. M*.....Jersey City, N. J.
E. F. Bosdevex, *Gen. For*.....Jersey City, N. J.
Belv. Div.: J. A. Anderson, *Supt*.Lambertville, N. J.
R. McDowell, *M. M*.....Lambertville, N. J.
Amboy Div.: W. N. Bannard, *Supt*.Camden, N. J.
Thos. Kerr, *M. M*.....So. Amboy, N. J.
P. S. Bocart, *Gen. For*.....So. Amboy, N. J.
(3)(4) Camden & At. Rd.....75 m. 18 lo. 261 c.
Joseph Crawford, *Supt*.....and
Rufus Hill, *M. M*.....Camden, N. J.
Samuel Wills, *M. C. B*.....Camden, N. J.
(3) West Jersey R. R.....4-9 g. 188 m. 27 lo. 594 cars.
Joseph Crawford, *Gen. Supt*.....Camden, N. J
W. McAlister, *M. M*.....Camden, N. J
C. C. Williams, *Gen. For*.....Camden, N. J.
(4) Phila., Wilm. & Balt. R.R. 409 m. 128 lo. 1,882 c.
H. F. Keney, *Gen. Supt*.....Philadelphia, Pa.
J. M. Wallis, *S. M. P*.....Philadelphia, Pa.
H. D. Gordon, *M. M*.....Wilmington, Del.
W. H. Lungren, *M. C. B*.....Wilmington, Del.
Cen. Div.: L. K. Lodge, *Supt*.....Media, Pa.
Del. Div.: T. N. Mills, *Supt*.....Clayton, Del.
Mo. Div.: H. H. Carey, *Supt*.....Wilmington, Del.
(5) Phila. & Erie R. R. Divs.: 437 m. 110 lo. 3,089 c.
R. Sloan, *Gen. Supt*.....Williamsport, Pa.
A. O. Dayton, *Supt. Mo. Po*.....Williamsport, Pa.
Eu. Div.: E. B. Wentzil, *Supt*.Williamsport, Pa.
Sun. H. & W. Div.: A. Walter, *Supt.*; *Sunbury*
H. K. Stout, *M. M*.....Sunbury, Pa.
Mid. Div.: Tho. Roberts, *Supt*.....Lewistown, Pa.
Wm. L. Holman, *M. M*.....Renovo, Pa.
West'n Div.: W. J. Reynolds, *Supt*.....Erie, Pa.
J. Gaskill, *M. M*.....Emporium, Pa.
(6) Northern Central Ry. 4-9 g. 346 m. 152 lo. 6,610 c.
Robert Sterling, *Gen. Supt*.....Baltimore, Md.
A. O. Dayton, *Supt. M. P*.....Williamsport, Pa.
A. W. Sumner, *Pur. Agt*.....Baltimore, Md.
J. M. Cade, *M. M*.....Baltimore, Md.
G. W. Demarest, *Gen. For*.....Baltimore, Md.
Susq. Div.: E. B. Westfall, *Supt*.Williamsport, Pa.
Sham. Div.: A. Walter, *Supt*.....Sunbury, Pa.
Balt. & Sus. Divs.: S. Meade, *Supt*.Elmira, N. Y.
Jas. Strode, *M. M*.....Elmira, N. Y.
Y. C. Dyott, *Gen. For*.....Elmira, N. Y.
Baltimore Div.: J. W. Kapp, *Supt*.Baltimore, Md.
(7) Balt. & Pot. & Alex. & Fred. 125 m. 30 lo. 360 c.
H. F. Kenny, *Gen. Supt*.....Philadelphia, Pa.
A. W. Sumner, *Pur. Agt*.....Baltimore, Md.
J. M. Wallis, *Supt. Mo. Po*.....Philadelphia, Pa.
H. D. Gordon, *M. M*.....Wilmington, Del.
J. Lescallett, *For. Mach. Shop*.Washington, D. C.
R. F. Downs, *For. Car Shop*..Washington, D. C.
Penn. Coal Co.'s R. R. 4-3 g. 67 m. On eq. 2,271 c.
J. B. Smith, *Gen. Supt*.....Dunmore, Pa.
And. Crane, *M. M*.....Dunmore, Pa.
Geo. W. Simpson, *M. C. B*.....Dunmore, Pa.
Pennsylvania, Slatington & New England R. R.
In progress: 4-8½ g. 18 m. 1 lo. Trestle work.
C. H. Stanton, *Supt*.....New York, N. Y.
Pennsylvania & Erie R. R.—Early Branch.
C. R. Gray, *Gen. Supt*.....Ridgeway, Pa.
Pensacola & Atlantic R. R. 5 g. 161 m. 9 lo. 67 cars.
E. O. Saltmarsh, *Gen. Supt*.....Pensacola, Fla.
W. D. Robb, *M. M*.....Pensacola, Fla.
Pensacola & Perdido R. R.....5 g. 10 m. 5 lo. 93 cars.
B. F. Simmons, *Pur. & Supt*.....Pensacola, Fla.
H. W. Simmons, *Pur. Agt*.....Pensacola, Fla.
C. C. Schutte, *M. M. & C. B*.....Pensacola, Fla.
People's Ry.....4-8½ g. 15 m. 2 lo. 14 cars.
W. D. Pollard, *Supt*.....Pottsville, Pa.
Peoria, Decatur & Evansville Ry.
4-8½ g. 254 m. 30 lo. 1,060 cars.
G. L. Bradbury, *Gen. Man*.....Peoria, Ill.
P. Reilly, *M. M*.....Mattoon, Ill.
Peoria & Farmington R. R. *See Cen. Io.*)
Peoria & Pekin Union Ry. 4-8½ g. 20 m. 12 lo. 2 c.
Thos. B. Burnett, *Gen. Supt. & P. A*.Peoria, Ill.
O. W. Barker, *M. M*.....Peoria, Ill.
R. F. Hurd, *M. M. & C. B*.....Peoria, Ill.
Perkiomen R. R.....4-8½ gauge 39 miles.
D. B. Clauss, *M. M*.....Pennsburg, Pa.
H. Boyd, *Pur. Agt*.....Norristown, Pa.
Petersburg R. R.....4-8½ g. 64 m. 10 lo. 132 cars.
R. M. Sully, *Supt*.....Petersburg, Va.
Geo. F. Jones, *Pur. Agt*.....Petersburg, Va.
J. R. Woodard, *M. M*.....Petersburg, Va.
J. W. Fleming, *M. C. B*.....Petersburg, Va.
Phila., Wilmington & Balt. R. R. *See Penna. R. R.*)
Peterhoagh & Hillsborough. *See Ashtabula, &c.*)
Philadelphia, Newtown & N. Y. R. R. 4-8½ g. 23 m.
W. M. Rose, *Supt*.....Long Branch, N. J.
Phila. & Atlantic City Ry. 3-6 g. 55 m. 11 lo. 134 cars.
W. Bertolet, *Supt*.....Philadelphia, Pa.
S. S. Wilson, *Pur. Agt*.....Philadelphia, Pa.
H. M. Messimer, *M. M*.....Camden, N. J.
E. Lippincott, *M. C. B*.....Camden, N. J.
Philadelphia & Erie R. R. (*See Penna. R. R.*; (5) Div.)
Philadelphia & Reading R. R. (and Branches)
4-8½ g. 1,582 m. 907 lo. 30,000 cars.
John F. Wootten, *Gen. Man*.....Philadelphia, Pa.
W. S. Wilson, *Pur. Agt*.....Philadelphia, Pa.
Geo. Eltz, *Supt. Trans*.....Reading, Pa.
L. B. Faxon, *Eng. of Mach*.....Reading, Pa.
No. R. & Bound Brook Div.:
I. A. Sweigard, *Supt*.....Philadelphia, Pa.
Mahanoy & Shamokin and other Divs.:
J. H. Ohausen, *Supt*.....Pottsville, Pa.
D. C. Reinhart, *Asst. Supt*.....Catawissa, Pa.
A. A. Hesser, *Asst. Supt* Mahanoy Plane, Pa.
Schuylkill & Susquehanna Br.:
H. F. Tracy, *Supt*.....Pine Grove, Pa.
Reading & Columbia Br.:
A. M. Wilson, *Supt*.....Columbia, Pa.

2 N. J. Central Div.:
W. W. Stearns, *Supt*.....Elizabeth, N. J.
W. Woodcock, *M. M*.....Elizabethport, N. J.
Geo. Hackett, *M. M*.....Elizabethport, N. J.
C. G. Williams, *M. M*.....Jersey City, N. J.
John Alspaugh, *M. M*.....Phillipsburg, N. J.
L. Bridle, *M. M*.....Long Branch, N. J.
N. J. So. Div.: W. W. Stearns, *Supt*.Elizabeth, N. J.
Wm. Montgomery, *M. M*.....Manchester, N. J.
Chas. N. Sawyer, *M. C. B*.....Manchester, N. J.
Lehigh & Susquehanna Div.:
W. S. Follemus, *Supt*.....Mauch Chunk, Pa.
Pittsburgh, Bradford & Buffalo Ry. (*See Pitts. & West.*)
Pittsburgh, Chartiers & Youghiogheny R. R.
4-8½ g. 19 m.
Geo. S. Graeom, *Gen. Man*.....Pittsburgh, Pa.
Pittsburgh, Cincinnati & St. Louis Ry. (5 Gen. Divs.)
4-9 g. 916 m. 230 lo. 7,133 cars.
James McCrea, *Manager*.....Columbus, O.
Wm. Mullins, *Pur. Agt*.....Pittsburgh, Pa.
Edward H. Wall, *Supt M. P*.....Columbus, O.
(1) P. C. & St. L. Div.: E. B. Taylor, *Supt*.Louisville, Ky.
C. B. Street, *M. M*.....Dennison, O.
W. H. Copeland, *Car Shops*.Louisville, Ky.
2) C. & M. V. Div.: W. F. Black *Supt*..Zanesville, O.
Leroy Kelis, *M. M*.....Lancaster, O.
Wm. Mellen, *Gen. For*.....Lancaster, O.
Daniel Jewell, *Gen. F. For Shops*.Lancaster, O.
(3) Li. Mi. Div.: Ralph Peters, *Supt*.....Lima, O.
Leroy Kelis, *M. M*.....Cincinnati, O.
Jos. Underwood, *G. F. Car Shops*.Cincinnati, O.
(4) J. M. & I. R. R.: E. W. McKenna, *Supt*.....Lima, O.
Wm. Swanston, *M. M*.....Jeffersonville, Ind.
s.t'w. Austin, *G. F. C. Shops*.Jeffersonville, Ind.
(5) Indianapolis & Vincennes R. R.
J. J. Turner, *Supt*.....Indianapolis, Ind.
Pittsburgh, Cleveland & Toledo R. R.
4-8½ g. 78 m. 18 lo. 525 cars.
C. H. Andrews, *Pres*.....Youngstown, O.
W. F. Nofcker, *M. M*.....Youngstown, O.
Pittsburgh, Ft. Wayne & Chicago Ry. (*See Penna. Co.*)
Pittsburgh Southern Ry.....(*See Balt. & O.*)
Pitts. & Castle shannon R. R. 3-4 g. 9 m. 5 lo. 428 c.
James M. Bailey, *Gen. Supt*.....Pittsburgh, Pa.
Holmes Ward, *M. M*.....Castle Shannon, Pa.
Wm. E. Long, *M. C. B*.....Pittsburgh, Pa.
Pitts. & Lake Erie R. R. 4-8½ g. 70 m. 30 lo. 1,539 c.
W. C. Quincy, *Gen. Man*.....Pittsburgh, Pa.
D. H. Hostetter *Pur. Agt*.....Pittsburgh, Pa.
R. W. Jones, *Mast. Trans*.....Pittsburgh, Pa.
S. W. Haines, *M. M*.....Pittsburgh, Pa.

Pittsburgh, McKeesport & Youghiogheny.
4-8½ g. 57 m. 19 lo. 278 cars.
W. G. Quinby, *Gen. Man*.....Pittsburgh, Pa.
R. W. Jones, *M. of Trans*.....Pittsburgh, Pa.
S. W. Haines, *M. M*.....Pittsburgh, Pa.
Pitts. & Western R. R. 3 & 4-8½ g. 110 m. 18 lo. 965 c.
Pitts., Bradford & Buff. Ry. 3 g. 93 m. 8 lo. 163 c.
Tho. M. King, *Gen. Man*.....Allegheny, Pa.
J. T. Johnson, *Supt*.....Allegheny, Pa.
Morton Hall, *Pur. Agt*.....Allegheny, Pa.
W. M. Flahavhan, *M. M*.....Allegheny, Pa.
Pontiac, Oxford & Ft. Austin R. R. 100 m.
Geo. W. Deberoise, *Pr. & Gen. Man*.N. York, N. Y.
Jas. Houston, *Gen. Supt*.....Pontiac, Mich.
Port Huron & Lake Michigan Ry. 3 g. 318 m. 15 lo. 398 c.
H. McMorran, *G. Man. & P. A*.Port Huron, Mich.
J. R. Wadsworth, *Supt*.....Port Huron, Mich.
Chas. Deffenbach, *M. M*.....Port Huron, Mich.
Benj. Hillier, *M. C. B*.....Port Huron, Mich.
Port Jervis & Monticello R. R. 4-8½ g. 24 m. 3 lo. 13 c.
M. V. Heller, *Gen. Man*.....Port Jervis, N. Y.
Port Royal & Augusta Ry.....5 g. 180 m. 16 lo. 310c.
Jno. Screven, *Supt*.....Augusta, Ga.
T. P. Warwick, *M. M. & M. C. B*.Augusta, Ga.
Portland & Ogdensburg. 4-8½ g. 110 m. 11 lo. 311 c.
J. Hamilton, *Gen. Man. & P. A*.....Portland, Me.
M. M.....Portland, Me.
W. G. Brewer, *M. C. B*.....Portland, Me.
Portland & Rochester R. R. 4-8½ g. 52 m. 8 lo. 226 c.
J. W. Peters, *Supt. & Pur Agt*...Portland, Me.
R. C. Compson, *Pur. Agt*.....Portland, Me.
David Dow, *For. of Car Repairs*.Portland, Me
Potomac, Fredericksburg & Piedmont R. R. 3 g. 75 m. 2 lo.
Wm. M. Grafton, *Supt*.....Fredericksburg, Va.
W. J. Sweigard, *M. M*.....Fredericksburg, Va.
Pough. Hart. & Bos. R. R.....4-8½ g. 45 m. 4 lo. 65 c.
J. A. Perkins, *Supt*.....Poughkeepsie, N. Y.
Providence & Worcester R. R. 4-8½ g. 50 m. 2 lo. 75 c.
Pratt Coal & Iron Company's R.R. 5 g. 20 m. 4 lo. 184 c.
W. L. Gude, *Gen. Man*.....Pratt Mines, Ala.
Prescott & Duffin's Parallel R. R.
4-8½ g. 77 miles in progress.
Samuel A. Hersey, *Gen. Man*.....Prescott, Ariz.
Prince Edward Island Ry. 3-6 g. 196 m. 18 lo. 280 c.
Jas. Coleman, *Supt. & Pur. Agt*.
Jos. Unsworth, *M. Supt. & Storekeeper*; and
D. M. Fraser, *M. C. B*.....Charlottetown, P. E. I.
Profile & Franconia R. R. 4-8½ g. 15 m. 1 lo. 30 c.
Emmons Raymond, *Pur. Agt*.....Boston, Mass.
C. H. Greenleaf, *Supt*.....Profile House, N. H.
Prospect Park & Coney Island R. R.
4-8½ g. 15 m. 8 lo. 123 cars.
R. Schermerhorn, *Supt*.....Brooklyn, N. Y.
Martin Painter, *M. M*.....Brooklyn, N. Y.
Prov., Warren & Bristol R. R. 4-8½ g. 19 m. 6 lo. 79 c.
Jno. Unsworth, *Supt. & Storekeeper*; and
Rufus Smith, *M. M. & C. B*.....Bristol, R. I.
Penn. Coal Co.'s R. R. 4-8½ g. 67 m. On eq. 2,271 c.
Wm. Tinkham, *Gen. Man*.....Providence, R. I
G. T. Richardson, *M. M*.....Providence, R. I.
Prov. & Worcester R. R.....500 miles operated.
W. E. Chamberlain, *Supt*.....Providence, R. I.
A. Griggs, *Supt. & C. & D*.....Providence, R. I.
Pullman's Palace Car Co.....1,100 passenger cars.
Geo. M. Pullman, *Pres*.....Chicago, Ill.
H. Porter, *Gen. Supt*.....New York, N. Y.
Geo. F. Brown, *Gen. Supt*.....Chicago, Ill.
W. H. Morkill, *Jr., Pur. Agt*.Sherbrooke, P. Q.
Jas. Seivright, *M. M*.....Sherbrooke, P. Q.
Quebec, Montreal, Ottawa & Occidental Ry.
4-8½ g. 110 m. 663 cars.
L. A. Senecal, *Gen. Supt*.....Quebec, Que.
Quebec & Lake St. John Ry. 4-8½ g. 36 m. 3 lo. 50 c.
A. G. Gosselin, *Supt. & Pur. Agt*.....Quebec Can.
Frank Fournier, *Supt*.....St. Raymond, P. Q.
Jos. Gosselin, *M. M*.....St. Raymond, P. Q.
Queen Anne's & Kent and Townsend Branch R. R.
(*See Penna.*; (4) *Div.*)

R

Raleigh & Augusta Air-Line: Carolina Central
Raleigh & Gaston R. R. 4-8½ g. 436 m. 50 lo. 994 c.
John C. Winder, *Gen. Man. & Pur. Agt*.Raleigh, N. C.
Raleigh Rds.....4-8½ g. 200 m. 87 lo. 638 cars.
R. R. Harding, *Supt. of Mach*.Raleigh, N. C.
Carolina Cen. R. R. 4-8½ g. 220 m. 20 lo. 431 c.
L. C. Jones, *Supt*.....Wilmington, N. C.
James Bell, *Supt. of Mach*.Lumberton, N. C.
S. B. Ethridge, *M. C. B*.....Laurinburg, N. C.
Rensselaer & Saratoga R.R.(*See Del. & Hud. Can. Co.*)
Rhinebeck & Connecticut R. R. (*See Part of Ct. Wa.*)
Richmond, Fredericksburg & Potomac R. R.
4-9 g. 81 m. 14 lo. 140 cars.
E. T. D. Myers, *Gen. Supt*.....Richmond, Va.
T. L. Courtney, *Asst. Supt*.....Richmond, Va.
H. Rubin, *M. M*.....Richmond, Va.
W. H. Trainham, *M. C. B*.....Richmond, Va.
Richmond & Danville R. R. 4-9 g. 631 m. 431 c.
Decatur Axtell, *Rec. & Gen. Man.*Richmond, Va.
H. Stevenson, *Gen. Supt*.....Richmond, Va.
Geo. D. Harris, *M. M. & C. B*.....Richmond, Va.
Richmond & Petersburg R. R. Co.'s Roads.
1,736 miles 218 loco. 6,000 cars.
A. L. Rives, *Gen. Man*.....Richmond, Va.
Frank Thomas, *Gen. Pur. Agt*.....Richmond, Va.
J. P. Minetree, *Pur. Agt*.....Richmond, Va.
R. H. Wade, *Supt. No. Po*.....Richmond, Va.
(1) Rich. & Dan. R. R. 87 m. 131 lb. 387 cars.
Rich. & Dan. Div.: 5 g. 320 m. 80 lo. 1,797 c
Wm. H. Green, *Supt*.....Richmond, Va.
M. M.....Richmond, Va.
J. B. Vaughan, *For. Car Sh*..Richmond, Va.
North Carolina Div.: 5 g. 225 m. 70 lo. 308 c.
A. B. Andrews, *Supt*.....Raleigh, N. C.
W. H. Peterson, *Car & M. Comp*.Raleigh, N. C.
J. C. Holt, *For. Car Sh*.Company's Sh., N. C.
Asst.—& Char. Air Line, 5 g. 280m. 31 lo. 415 c.
Narrow-Gauge Branches, 3 g. 50 m. 41 lo.
Emmrd Berkley, *Supt*.....Atlanta, Ga.
W. H. Hungerford, *M. M*.....Atlanta, Ga.
Z. T. Smith, *For. Car Sh*.....Atlanta, Ga.
Charlotte, Col. & Aug. R. R. 5g. 239 m. 22 lo. 387 c.
W. H. Green, *Supt*.....Columbia, S. C.
J. H. Green, *M. M*. (2 roads)...Columbia, S. C.
(3) Columbia & Greenville R. R. 5 g. 142 m. 12 lo. 294 c.
G. S. Talcott, *Supt*.....Columbia, S. C.
O. Meredith, *For. R. & C. Rep*.....do.
(4) Virginia Midland Ry. 4-8½ g. 225 m. 41 lo. 631 c.
W. M. S. Dunn, *Eng. & Supt*.Alexandria, Va.
W. H. Hungerford, *M. M*.....Atlanta, Ga.
J. T. Nalls, *M. C. B*.....Alexandria, Va.
Richmond & Petersburg R.R. 4-8½ g. 33 m. 8 lo. 132 c.
Richmond & Peters. Ry.....3-6 g. 22 m. 8 lo. 40 c.
John O'Brien, *M. M*.....Richmond, Va.
Rio Grande R. R.....3-6 g. 225 m. 20 lo. 400 c.
M. J. Gomila, *Rec. & Gen. Man*.Brownsville, Tex.
G. W. Rendall, *M. M*.....Brownsville, Tex.
Jos. Harwood, *M. M*.....Brownsville, Tex.
Rio Grande & Pecos Ry. 4-8½ g. 27 m. In progress.
W. W. Hungerford, *M. M*.....Laredo, Tex.
Rochester & Lake Ontario Ry 4-8½ g. 6 m. 2 lo. 10 c.
N. B. Ellison, *Man*.....Rochester, N. Y.
Rochester & Pittsburgh R. R. 4-8½ g. 200 m. 80 lo. 3,350 c.
Geo. E. Merchant, *Gen. Man*.....Rochester N. Y.
J. T. Richardson, *Pur. Agt*.....Rochester, N. Y.
C. W. Mills, *Supt. M. P*.....Rochester, N. Y.
Rock Island & Mercer County R. R., and
Rock Island & Peoria Ry. 4-8½ g. 69 m. 13 lo. 357 c.
R. R. Cable, *P. & Gen. Supt*.....Chicago, Ill.
R. I. & P. Ry.
H. B. Sudlow, *Supt. & P. A*.....Rock Island, Ill.
Joseph Elder, *M. M*.....Peoria, Ill.
R. I. & M. U. R. R. H. B. Sudlow, *Supt.* R. I. Island, Ill.
J. H. Parks, *M. M*.....Rock Island, Ill.
Rogersville & Jefferson R. R.....5 g. 16 m. 1 lo. 6 cars.
C. M. Leuty, *Supt*.....Rogersville, Tenn.
Rome (Ga.) R. R.....5 g. 30 m. 2 lo. 17 cars.
Eben Hillyer, *Pres. & Supt*.....Rome, Ga.
O. W. Harbin, *M. M*.....Rome, Ga.
Rome, Watertown & Ogdensburg R. R.
4-8½ g. 418 m. 61 lo. 1,831 cars.
H. M. Hilton, *Gen. Man. & P. A*.Oswego, N. Y.
Geo. H. Haseltin, *S. M. P. & M*.Oswego, N. Y.
E'n Div.: J. D. Remington, *A. Supt*.Watertown, N. Y.
W'n Div.: W. H. Chauncy, *A. Supt*.Ogdensburg, N. Y.
Roodhouse & Scottsville Ry.....In progress.
Geo. F. Merrill, *Gen. Man*.....Chicago, Ill.
Ruby Hill R. R.....(*See Eureka & Pal.*)
Rumford Falls & Buckfield R. R. 4-8½ g. 20 m. 21 c.
L. L. Lincoln, *Supt. & Pur. Agt*...Canton, Me.

S

Sabine & East Texas Ry.....(*See Cen. Pac.*)
Sacramento & Placerville R. R.....(*See Cen. Pac.*)
Sagina & Bay & Northern R. R. 4-8½ g. 25 m. 3 lo. 136 c.
J. Jackson, *Gen. Man*.....Pinconning, Mich.
F. T. Lillie, *Acct. Pur. Agt*.....Pinconning, Mich.
Edward Keeler, *M. M*.....Pinconning, Mich.
Saginaw, Tuscola & Huron R. R.
3 g. 50 m. 5 lo. 85 cars.
M. B. Wilkinson, *Gen. Supt*.E. Saginaw, Mich.
Saginaw Valley & St. Louis R. R. 4-8½ g. 39 m. 6 lo. 64 c
N. W. Merrill, *Supt*.....Saginaw, Mich.
Allan Bourn, *Pur. Agt*.....Detroit, Mich.
Geo. C. Bennett, *M. M*.....Alma, Mich.
Salt Lake & Western R. R. (*See Un. Pac.*; (6) *Div.*)
San Francisco & San Joaquin R. R. 4-8½ g. 130 m. 11 lo. 345 c
Arthur Hughes, *Gen. Man*..San Francisco, Cal.
H. C. Whiting, *Supt*.....San Safael, Cal.
Ed. Reynolds, *M. C. B*.....Donahue, Cal.
Ed. Reynolds, *M. C. B*.....Donahue, Cal.
Sanborn, Cooper & Fairbanks' Line M. R. R. Comp's.
C. A. Roberts, *Gen. Man*.....Sanborn, Dak.
Sandy River R. R.....4 g. 18 m. 3 lo. 36 cars.
H. A. Beal, *Pres. & Supt*.....Phillips, Me.
M. Saunders, *M. M. & C. B*.....Phillips, Me.
Sandusky, Bellevue & Southern R. R.....(*See B. & O.*)
Sanford & Indian River R. R.....(*See So. Flor.*)
San Luis Obispo & Santa Maria R. R.
3 g. 50 m. 3 lo. 130 m. 11 lo. 345 c
Charles Goodall, *Man*.....San Francisco, Cal.
San Pete Valley R. R.....3 g. 33 m. 6 lo. 57 cars.
S. Bamberger, *Man*.....Salt Lake City, U. T.
J. E. Bamberger, *Pur. Agt*.....Salt Lake, U. T.
B. Meek, *M. M

St. Croix & Penobscot R. R. 4-8½ g. 22 m. 4 lo. 195 c
S. W. Haycock, *Supt. & Pur. Agt* ..Calais, Me.
G. H. Corsen, *M. M.* .....Milltown, Me.
H. C. Tincker, *M. C. B.* .....Milltown, Me.
St. Helen, Houghton Lake & West. R. R. 4-8½ g. 13 m.
Z. C. Jessop, *Gen. Man.* .....Detroit, Mich
St. John & Maine Ry. .....(*See New Brunswick.*)
St. John's Ry. .....4-8½ g. 14½ m. 3 lo. 34 cars.
R. McLaughlin, *Pr. & Supt.* ..Jacksonville, Fla.
J. M. Owens, *M. of Mach.* ...St. Augustine, Fla.
St. John's & Lake Eustis Ry. .....4-8½ g. 48 m.
W. J. Jarvis, *Supt.* .....Ft. Mason, Fla.
St. Johnsb'ry & Lake Champ. 4-8½ g. 130 m. 15 lo. 372 c
Asa B. Jewett, *Supt. & P. & A.* ..St. Johnsbury, Vt.
Geo. E. Howe, *M. M. & C. B.* St. Johnsbury, Vt.
St. Joseph Valley R. R. .....5 g. 15 m. 1 lo. 11 cars
E. T. Chase, *Gen. Man.* ..Berrien Springs, Mich
St. Joseph & Des Moine R. .....3 g. 13 m. 4 lo. 70 cars
T. T. Onderdonk, *Supt.* .....Bonne Terre, Mo
St. Joseph & Western R. R.
4-8½ g. 252m. 21 lo. 175 cars.
I. D. Tuthill, *Gen. Supt. & P. A.*St. Joseph, Mo.
E. Sleepy, *M. M. & C. B.* .....St. Joseph, Mo.
St. Joseph & Des Moines R. R. (*See K. C., St. J. & C. B.*)
St. Lawrence & Ottawa Ry. .....(*See Can. Pac.*)
St. Louis, Alton & Terre Haute R. R.
Main Line. (*See C., C., C. & I.; Ind. & St. L. Div.*
St. Louis & Cairo Div.: 4-8½ g 137 m. 19 lo. 800 c
G. W. Parker, *Gen. Man.* .....St. Louis, Mo.
J. L. Hinckley, *Supt.* .....Belleville, Ill
R. M. Pringle, *M. M.* .....E. St. Louis, Ill.
St. Louis Bridge Co. and Tunnel R. R.
4-8½ g. 31 m. 2d lo. 11 cars.
Wm. Taussig, *Gen. Man.* .....St. Louis, Mo
A. W. Dickinson, *Supt.* .....St. Louis, Mo.
J. E. Williams, *Jr. ; Pur. Agt.* ...St. Louis, Mo
W. H. Smith, *M. M.* .....St. Louis, Mo.
St. Louis, C. Cœur & St. Ch. Ry. .....3 g. 16 m.
W. H. Osborn, *Gen. Man.* .....St. Louis, Mo.
St. Louis Coal R. R. .....4-8½ g. 93 m. 10 lo. 217 cars.
R. J. Cavett, *Supt.* .....Carbondale, Ill.
Jas. C. Bryden, *Pur. Agt.* .....St. Louis, Mo.
St. Louis, Des Moines & Northern Ry. 4-8½ g. 43 m.
C. F. Merle, *Supt.* .....Des Moines, Ia.
St. L. Ft. Scott & Wichita R.R. 4-8½ g. 214 m. 9 lo. 537 c.
J. W. Miller, *V. P. & Gen. Man.*..Fort Scott, Kan.
Thos. W. Lewis, *Asst. Supt.* .....Fort Scott, Kan.
Henry Berger, *M. M.* .....Ft. Scott, Kan.
St. L., Hannibal & Keokuk. 4-8½ g. 88 m. 5 lo. 70 c.
C. C. Case, *Rec. & Gen. Man.* ..Hannibal, Mo.
E. W. Hossington, *M. M.* .....Hannibal, Mo.
St. Louis, Iron Mt. & So. Ry. (*See Mo. Pac.; 4 Div.*)
St. Louis, Keokuk & No.-W'n Ry. (*See L., K. & W. Ry.*)
St. L., Salem & Little Rock. 4-9 g. 72 m. 5 lo. 111 c.
H. A. Crawford, *V. P. & P. A.* ..St. Louis, Mo.
E. B. Sankey, *Supt.* .....Salem, Mo.
Thomas Evereson, *M. M.* .....Steelville, Mo
J. W. Houston, *M. C. B.* .....Steelville, Mo.
St. Louis & Cairo R. R. .....3 g. 152 m. 22 lo. 880 cars.
Chas. Hamilton, *Gen. Supt.* .....St. Louis, Mo.
T. W. Newell, *M. M.* .....E. St. Louis, Mo.
St. L. & San Fran. R. 4-8½ g. 902 m. 88 lo. 3,000 c.
C. W. Rogers, *V. P. & Gen. Man.*..St. Louis, Mo.
D. H. Nichols, *Asst. Trans.*..No. Springfield, Mo.
A. T. Mann, *Jr., Pur. Agt.* .....St. Louis, Mo.
M. Kearney, *M. M. & C. B.*..No. Springfield, Mo.
East Div.: A. Veech, *Supt.* .....St. Louis, Mo.
Central Div.: W. A. Thomas, *Supt.*..Springfield, Mo.
Kan. Div.: J. R. Wentworth, *Supt.*Neodesha, Kan.
St. Martin's & Upham Ry. 4-8½ g. 30 m. 2 lo. 8 cars.
A. E. Kilham, *Manager* .....St. Martin's, N. B.
St. Paul Eastern Grand Trunk Ry. .....4-8½ g. 15 m.
H. C. Lamb, *Gen. Supt.* .....Oconto, Wis.
St. Paul, Minneapolis & Manitoba Ry.
4-8½ g. 1,402 m. 201 lo. 5,008 cars.
A. Manvel, *Gen. Man.* .....St. Paul, Minn.
E. B. Wakeman, *Asst. Gen. Supt.*St. Paul, Minn.
H. C. Morrison, *Pur. Agt.* .....St. Paul, Minn.
H. Middleton, *M. M. & C. B.* ...St. Paul, Minn.
Breck. Div.: W. S. Kemp, *Supt.*...St. Paul, Minn.
F. Div.: J. R. Rose, *Supt.* .....St. Paul, Minn.
No'n Div.: A. Guthrie, *Supt.* .....Crookston, Minn.
St. Paul & Duluth R. R. 4-8½ g. 225 m. 37 lo. 1,080 c.
W. H. Fisher, *Gen. Supt.* .....St. Paul, Minn.
J. G. Callahan, *Pur. Agt.* .....St. Paul, Minn.
Chas. F. Ward, *M. M. & C. B.* ...St. Paul, Minn.
State Line & Sullivan R. R. 8½ g. 25 m. 3 lo. 263 c.
I. O. Blight, *Supt.* .....Towanda, Pa.
Staten Island R. R. .....4½ g. 12 m. 4 lo. 18 c.
J. W. Wilbur, *Supt.* .....New York, N. Y
Stony Clove & Catskill Mountain R. R.
3 g. 14 m. 2 lo. 22 cars.
Geo. Cockendaul, *Gen. Supt.*....Rondout, N. Y
Stony Creek R. R. .....4-8½ g. 103 m.
Geo. B. Boggs, *Supt* .....Norristown, Pa.
Sterling Mountain Ry. .....6 g. 8 m. 2 lo. 145 cars.
C. Missimer, *Supt.* .....Sloatsburg, N. Y.
Suffolk Lumber R. R. .....3 g. 15 m. 3 lo. 41 cars.
Chas. H. Whaley, *Supt.* .....Suffolk, Va.
Summit Branch R. R. .....4-9 g. 29 m. 7 lo. 10 cars.
Thomas Gucker, *Supt.* .....Williamsport, Pa.
Susquehanna & Delaware River R. R. (*See Pa. R'ds.*)
D. Y. Kilgore, *Pres.* .....Philadelphia, Pa.
Sussex R. R. .....*See Del., Lack. & W. R. R.*
Syracuse, Binghamton & N. Y. R. R. (*See D. L. & W.*)
Syr., Ontario & N. Y. R. R.
Albert Allen, *Supt.* .....New York, N. Y
Syracuse, Geneva & Corning; Corning, Cowanasque & Antrim R. Ra. 4-8½ g. 142 m. 2d lo. 1,044 c.
A. H. Gorton, *Supt.* .....Corning, N. Y.
W. E. Gorton, *Asst. Supt.* .....Corning, N. Y.
W. H. Chapne, *Pur. Agt.* .....Corning, N. Y.
O. C. Patchell, *M. M.* .....Corning, N. Y.
C. J. Butler, *M. C. B.* .....Corning N. Y.

T

Tennessee Coal R. R. .....5 g. 28 m. 8 lo. 204 cars.
A. M. Shook, *Gen. Man.* .....Tracy City, Tenn.
W. A. Knight, *M. M.* .....Tracy City, Tenn.
Tennessee & Sequatchee Valley R. R.
3 g. 42 m. 1 lo. 24 cars.
Chas. Clinton, *Gen. Supt.* ...Spring City, Tenn.
P. V. Mooney, *Pur. Agt.* .....Spring City, Tenn.
Terre naute & Indianapolis R. R.
4-9 g. 43 m. 10 lo. 4,318 cars.
Joseph Hill, *Gen. Supt.* .....St. Louis, Mo.
C. R. Peddle, *P. Agt.* .....Terre Haute, Ind.
Geo. H. Prescott, *S. M. P. & M.*Terre Haute, Ind.
F. C. Cleaver, *M. M.* .....Terre Haute, Ind
E. D. Carter, *M. C. B.* .....Terre Haute, Ind.
Chas. Butler, *M. M.* .....Effingham, Ill.
Christian Iller, *Foreman* ...Indianapolis, Ind
Terre Haute & So.-Eastern Ry. 4-9 g. 44 m. 2 lo. 145 c.
Geo. Atherton, *Supt.* .....Terre Haute, Ind.
Texas-Mexican Ry. .....(*See Mex. Nat.*
Texas Trunk R. R. .....4-8½ g. 36 m. 2 lo. 8 cars.
Hugh Irwin, *Gen. Supt. & P. A.*Dallas, Tex.
Texas Western Ry. .....3 g. 52 m. 2 lo. 44 cars.
Henry Hatch, *Gen. Man.* .....Houston, Tex.
W. F. Gilpin, *M. M.* .....Houston, Tex.
Texas & N. O. R. R. (*See Cen. Pac.; G. H. & S. A. Div.*)
Texas & Pacific. .....(*See Mo. Pac. Sy. ; 6 Div.*)
Texas & St. Louis Ry. 3 g. 709 m. 84 lo. 2,000 cars.
W. R. Woodard, *Receiver and Gen. Man.*St. Louis, Mo.
J. J. Frey, *Gen. Supt.* .....Pine Bluff, Ark.
C. S. Brooke, *Pur. Agt.* .....St. Louis, Mo.
No. & Ark. Div.:
J. R. Hastings, *Supt* .....Pine Bluff, Ark.
Tex. Div.: H. Flanders, *Supt.* .....Tyler, Tex.
Ouachita Div.: Milan, *Gen. M.* .....Pine Bluff, Ark.
Tionesta Valley R. R. .....3 g. 15 m.
George Dickinson, *Gen. Supt* ...Sheffield, Pa.
Tioga R. R. .....4-8½ and 6 g. 67 m. 18 lo. 960 cars.
L. H. Shattuck, *Supt.* .....Blossburg, Pa.
J. C. Guthrie, *Pur. Agt.* .....New York, N. Y.
Pero Bonny, *M. M.* .....Blossburg, Pa.
T. H. Stratton, *M. C. B.* .....Blossburg, Pa.
Toledo, Ann Ar. & No. 31 h. Ry.
4-8½ g. 63 m. 9 lo. 186 c.
J. M. Ashley, *Gen. Man.* .....Ann Arbor, Mich.
H. W. Ashley, *Supt. & Pur. Agt.* ..do
C. C. Dodge, *M. M.* .....Ann Arbor, Mich.
Toledo, Cin. & St. Louis R.R. 3 g. 709 m. 101 lo. 3,500 c.
E. P. Murray, *Gen. Supt.* .....Toledo, O.
W. W. Stewart, *Pur. Agt.* .....Toledo, O.
Thos. Robertson, *M. M.* .....Delphos, O.
Toledo Div.: W. H. Vandergrift, *Supt.* ..do
J. S. Wiers, *Eng. Car Rep.*.....Delphos, O.
Tol., Cin. & St. L. Div.:
E. C. Henderson, *Gen. Man.*Indianapolis, Ind.
J. E. Gimperling, *Supt.* .....Dayton, O
H. G. Norten, *Pur. Agt* ...Indianapolis, Ind
E. Niscroff, *M. M.* .....Dayton, O
Dayton & Ironton Div.:
C. C. Clark, *Supt.* .....Ironton, O
St. Louis Div.: Frank F. Allen.....Charleston, Ill
P. H. Murphy, *M. M.* .....Charleston, Ill.
Toledo & Indianapolis R. R. 4-8½ g. 43 m. 4 lo. 118 c.
David Robison, *Jr., Rec.* .....Toledo, O
Toledo & South Haven R. R. .....(*See Pine Pine.*)
Tonawanda Val. & Cuba R. R. (*See Brad., B. & R.*)
Toronto, Grey & Bruce Ry. (*See Canadian Pacific.*)
Toronto & Nipissing Ry. .....(*See Mid. Ry. of Can.*)
Troy & Boston R. R. .....4-8½ g. 88 m. 884 cars.
D. Robinson, *Pres.* .....Troy, N. Y.
Joseph Crandell, *Supt.* .....Troy, N. Y.
C. H. Hubbell, *Pur. Agt.* .....Troy, N. Y.
Z. B. Davis, *M. M.* .....Troy, N. Y.
A. Brewer, *M. C. B.* .....Troy, N. Y.
Troy & Greenfield R. R. & H. Tunnel. 4-8½ g. 44 m.
J. W. Locke, *Man.* .....North Adams, Mass.
Tuckerton R. R. .....4-9 g. 31 m. 2 lo. 39 cars.
J. J. Pharo, *Supt. & Pur. Agt.*Tuckerton, N. J.

U

Ulster & Delaware R. R. 4-8½ g. 74 m. 10 lo. 518 cars.
Jas. H. Jones, *Supt.* .....Rondout, N. Y.
John H. Decker, *M. C. B.* .....Rondout, N. Y.
Union Ry .....(*See Ches. & O.*)
C. E. James, *Pres.* .....Chattanooga, Tenn.
Thos. Lyonnell, *Gen. Man.*Chattanooga, Tenn.
Union Pacific Ry. (7 Gen. Divs.)
3 & 4-8½ g. 4,633 m. 510 lo. 10,550 cars.
S. R. Callaway, *Gen. Man.* .....Omaha, Neb.
S. T. Smith, *Gen. Supt* .....Omaha, Neb.
Thos. L. Kimball, *Asst. Gen. Man.*Omaha, Neb.
Pur. Agt. .....Omaha, Neb.
I. H. Congdon, *S. M. P. & C. D.*..Omaha, Neb.
John Wilson, *Asst. do.* .....Omaha, Neb.
(1) Neb. Div.: O. H. Dorrance, *Gen. Supt.*Omaha, Neb.
E. Div.: C. B. Havens, *Supt* .....Omaha, Neb.
R. McConnell, *M. M.* .....Omaha, Neb.
A. M. Collett, *M. C. B.* .....Omaha, Neb.
E. Sleepy, *M. M.* .....G. Island, Neb.
L. Pole Div.: W. A. Deuel, *Supt.* Cheyenne, W. T.
J. H. McConnell, *M. M.* .....N. Platte, Neb.
R. McDougall, *M. M.* .....Cheyenne, W. T.
(2) Wy. Div.: E. Dickenson, *Gen. Supt.*, Laramie, W. T.
T. E. Jarvis, *M. M.* .....Laramie, W. T.
T. A. Davis, *M. M.* .....Rawlins, W. T.
Wes. Div.: C. E. Wurtelle, *Supt.* Evanston, W. T.
Geo. C. Evans, *Gen. Man. M. M.*Evanston, W. T.
(3) Idaho Div.: R. Blickenderfer, *Gen. Supt.*Ogden, U.
F. Gurden, *M. M.* .....Pocatello, Id.
Ogden Short Line Div.:
R. Rickensderfer, *Supt.* .....Pocatello, Id.
Utah & Northern Div.:
W. P. P. St. Clair, *Supt.* .....Eagle Rock, Id.
W. J. Hemphill, *M. M.* .....Eagle Rock, Id.
W. J. Hemphill, *M. M.* .....Butte, M. T.
J. W. Paul, *Gen. For. C. D.* ...Eagle Rock, Id.
(4) Col. Cent. Div.: A. A. Egbert, *Gen. Supt.*Denver, Col.
F. Meirtsheimer, *M. M.* .....Denver, Col.
C. C. Div.: P. Touhy, *Supt.* .....Denver, Col.
So. Park Div.: D. K. Sweet, *A. Supt.*Kansas City, Mo.
(5) Kan. Div.: H. O. Brinkerhoff, *G. Supt.*Kan. City, Mo.
K. Pac. Div.: J. O. Brinkerhoff, *Supt.*Kan. C'y, Mo.
J. O. Chapman, *M. M.* .....Kansas City, Mo.
T. B. Roberts, *M. C. B.* .....Armstrong, Kan.
Kansas Central Div.:
J. O. Brinkerhoff, *Supt* ..Leavenworth, Kan.
Smoky Hill Div.:
O. H. Dorance, *Supt.* .....Wallace, Kan.
J. B. Dailey, *M. M.* .....Ellis, Kan.
6 Salt Lake & Western Div.:
W. W. ritter, *Supt.* .....Salt Lake City, Utah.
(7) Nevada Central Ry. .....3 g. 93 m. 4 lo. 78 cars.
Jos. K. Hoag, *Gen. Supt. & P. A.*New York, N. Y.
Z. T. Sprigg, *M. M.* .....Battle Mountain, Nev.
United States Rolling Stock Co. ..19 lo. 4,000 cars.
Wm. Thomas, *Pres.* .....New York, N. Y.
W. H. Chaddock, *Gen. Agt.* .....Chicago, Ill.
Upson County R. R. .....(*See Central Ga.*)
Utah Central Ry. .....4-8½ g. 280 m. 21 lo. 358 cars.
John Sharp, *Gen. Supt.* ...Salt Lake City, Utah.
S. H. Hill, *Pur. Agt.* .....Salt Lake City, Utah.
Geo. G. Bywater, *M. M.* ...Salt Lake City, Utah.
Jno. Reid, *M. C. B.* .....Salt Lake City, Utah.
Utah & Nevada Ry. .....3 g. 37 m. 3 lo. 33 cars.
W. W. ritter, *Gen. Man.* ...Salt Lake City, Utah.
Robert Anderson, *M. M.* ...Salt Lake City, Utah.
Utah & Northern Ry. .....(*See Union Pac.; (3) Div.*)
Utah & Pleasant Valley Ry. .....(*See Den. & Rio. Gr.*)
Utica, Ithaca & Elmira Ry. 4-8½ g. 120 m. 11 lo. 152 c.
Geo. S. Sadler, *Supt* .....Elmira, N. Y.
Edw. Mahler, *Pur. Agt* .....Elmira, N. Y.
C. J. Howe, *M. M. & M. C. B.*..Breesport, N. Y.
Utica, & Black Riv. R. R. 4-8½ g. 180 m. 25 lo. 419 c.
E. A. Van Horne, *Gen. Supt. & P. A.*Utica, N. Y.
H. W. Hammond, *Asst. Supt.*.....Utica, N. Y.
John Bailey, *M. M.* .....Utica, N. Y.
David James, *M. C. B.* .....Utica, N. Y.

V

Vaca Vall. & Clear Lake R. R. 4-8½ g. 30 m. 2 lo. 19 c.
G. R. Stevenson, *Gen. Supt.* ..Vacaville, Cal.
Valley Ry. (Ohio) ..... 4-8½ g. 85 m. 21 lo. 889 cars.
Isaac Reynolds, *Gen. Man.* .....Cleveland, O
J. E. Turk, *Supt.* .....Cleveland, O.
H. Meicner, *Pur. Agt* .....Cleveland, O.
Valley R. R. Va. .....4 g. 82 m.
S. Spencer, *Pres* .....Baltimore, Md.
Vermont Valley R. R. .....(*See Conn. River.*)
Vicksburg & Brunswick R. R. .....(*See Louisiana & Ga.*)
Vicksburg & Meridian R.R. (*See Cin., N. O. & Tex. Pac.*)
Vicks. Shreveport & Pac. R. R. (*See Cin., N. O. & T. P.*)
Victoria Ry. .....(*See Midland Ry. of Can.*)
Virginia Midland Ry. .....(*See Rich. & Dan.; (4) Div.*)
Virginia & Truckee R. R. 4-8½ g. 54 m. 17 lo. 375 c.
Carson & Colorado R. R. 3 g. 294 m. 6 lo. 134 c.
H. M. Yerington, *Gen. Supt.* ...Carson, Nev.
R. J. Laws, *Supt. & Col.* ..Hawthorne, Nev.
Hume Yerington, *Pur. Agt.* ...Carson, Nev.
J. N. Harding, *M. M.* .....Carson, Nev.
M. M. Ryde, *M. C. B.* .....Carson, Nev.

W

Wabash, Chester & W'n R. R. (*See St. Louis Coal.*)
Wabash, St. Louis & Pacific Ry. .....(4 Grand Divs.)
4-8½ g. 3,241 m. 508 lo. 17,230 cars.
A. L. Hopkins, *2d V. P.* .....St. Louis, Mo.
A. A. Talmage, *Gen. Man.* .....St. Louis, Mo.
H. H. Wellman, *Pur. Agt* .....St. Louis, Mo.
Jacob Johnston, *M. P. & M. Supt.*Moberly, Mo.
M. M. Martin, *Supt. Car Dept.* ..Decatur, Ill.
John Lang, *Supt. Car Dept* .....Moberly, Mo.
(1) East'n Div.: G. W. Stevens, *Supt.* .....Detroit, Mich.
J. B. Barnes, *M. M.* .....Fort Wayne, Ind.
John McKenna, *M. M.* .....Delta, Ind.
Cairo Div.: C. F. Lape, *M. M.*.. Mt. Carmel, Ill.
Rant'l Div.: B. F. Mathias, *Asst. Supt.*Rantoul, Ill.
C. W. Hollister, *Gen. Pass. Agt.*Detroit, Mich.
(2) Middle Div.: H. F. Clark, *Supt.* .....Springfield, Ill.
B. B. Rose, *M. C. B.* .....Decatur, Ill.
G. A. Hurd, *Asst. Supt.* .....Forest, Ill.
(3) Northern Div.: E. N. Armstrong, *Supt.*Decatur, Ill.
M. C. B. .....Decatur, Ill.
E. B. Hyde, *Asst. Supt.* .....Havana, Ill.
(4) Western Div.: R. G. Butler, *Supt.* .....Moberly, Mo.
W. H. Selby, *M. M.* .....Moberly, Mo.
C. S. Buck, *M. C. B.* .....Moberly, Mo.
E. Dresser, *Asst. Supt.* ...Stanberry, Mo.
D. Moin, Div.: C. F. Meek, *A. Supt.*Des Moines, Ia.
Walden's Ridge R. R. .....3 g. 23 m. 3 lo. 37 cars.
John T. Scott, *Gen. Man.* ...Jenks P. O., Tenn.
Wallkill Valley .....
J. E. Fields, *Gen. Supt* .....New York, N. Y.
Geo. H. Graves, *Supt* .....Kingston, N. Y.
E. Minshull, *M. M.* .....Middletown, N. Y.
S. W. Fowler, *Pur. Agt.* .....Middletown, N. Y.
Walla Walla & Columbia Riv. R. R. .....(*See Ore. Ry.*)
Walton R. R. .....4 g. 10 m. 1 lo. 7 cars.
D. H. Walker, *Pres* .....Monroe, Ga.
Warren & Farnsworth Valley R. R.
3 g. 10 m. 3 lo. 39 cars.
A. D. Wood, *Gen. Man* .....Warren, Pa.
Warwick Valley R. R. .....(*See Leh. & Hud. River.*)
Wasatch & Jordan Valley R. R. (*See Den. & Rio. Gr.*)
Washington, Ohio & West. R. R. 4-8½ g. 62 m. 3 lo. 87 c.
S. M. Brophy, *Supt* .....Alexandria, Va.
W. Mountjoy, *Act. For.* .....Alexandria, Va.
John Harrison, *M. C. B.* .....Alexandria, Va.
Waynesburg & Washington Rd. 3 g. 20 m. 3 lo. 36 c.
C. E. Bower, *Supt.* .....Waynesburg, Pa.
A. M. Kline, *M. C. B.* .....Waynesburg, Pa.
Welland Ry. .....4-8½ g. 25 m. 4 lo. 147 cars.
William Pay, *Supt.* .....St. Catharines, Ont.
Jas. Taylor, *M. M.* .....St. Catharines, Ont.
Wm. H. Pay, *M. C. B.* .....St. Catharines, Ont.
West End Narrow Gauge Ry. .....3 g. 16 m. 3 lo. 13 c.
Rolla Wells, *Supt.* .....St. Louis, Mo.
M. M. Hodgman, *M. M.* .....Florissant, Mo.
West Feliciana R. R. .....4-8½ g. 37 m. 2 lo. 22 cars.
J. R. McGehee, *Pr. & Gen. Supt.*Bayou Sara, La.
J. J. Tilton, *M. M. & C. B.* .....Bayou Sara, La.
W. Va., Central & Pittsburg Ry. 4-8½ g. 240 m. 16 lo.
T. B. Davis, *Gen. Man.* .....Piedmont, W. Va.
W. E. Porter, *Gen. Supt.* .....Piedmont, W. Va.
Geo. W. Harrison, *Pur. Agt.*..Piedmont, W. Va.
E. W. Lippencott, *M. M.* .....Piedmont, W. Va.
West. & East R. R. .....(*See Ill. Cen., N. O. Div.*)
West Jersey R. R. .....(*See Penn. R. R.; (3) Div.*)
Western R. R. (of Ala.) .....5 g. 85 m. 15 lo. 270 cars.
Atlanta & Pt. Point Rd. .....5 g. 87 m. 14 lo. 240 c.
Cecil Gabbett, *Gen. Man. & Supt.* ..Mont., Ala.
C. D. Wall, *M. M. & C. B.* .....Montgomery, Ala.
Western Counties Ry. 4-8½ g. 67 m. 8 lo. 107 cars.
J. Brignell, *Supt.* .....Yarmouth, N. S.
Western Maryland R. R. 4-8½ g. 127 m. 8d lo. 410 c.
J. M. Hood, *Pr. & Gen. Man.* ...Baltimore, Md.
R. J. Adair, *Pur. Agt.* .....Baltimore, Md.
David Holtz, *Mast. of Mach.*.Union Bridge, Md.
J. H. Nussear, *M. C. B.* .....Union Bridge, Md.
Western No. Carolina R. R. 5 g. 210 m. 7 lo. 100 c.
V. E. McBee, *Supt.* .....Salisbury, N. C.
Jos. P. Minetree, *Pur. Agt.*.....Richmond, Va.
G. W. Gaines, *M. M.* .....Salisbury, N. C.
Western & Atlantic R. R. 5 g. 138 m. 58 lo. 902 c.
R. A. Alexander, *Gen. Supt.* .....Atlanta, Ga.
A. B. Bostwick, *Asst. Supt.*.....Atlanta, Ga.
Lamar Collier, *M. M.* .....Atlanta, Ga.
Richard Peters, *M. C. B.* .....Atlanta, Ga.
Wheeling, Pittsburg & Baltimore R. R. (*See B. & O.*)
Wheeling & Lake Erie Ry. .....267 m. 37 lo. 1,202 c.
M. D. Woodford, *Rec. & Man.* ...Toledo, O.
O. F. Dunbar, *Gen. M. M.* .....Norwalk, O.
John Hilbrant, *Asst. M. M.* .....Norwalk, O.
Cleve. & Mar. Div.:
A. Galloway, *M. M.* .....Cambridge, O
Whitby & Port Perry & Lindsay Ry. (*See Mid. Ry. of Can.*)
White Water R. R. .....(*See Ft. W., Cin. & Low.*)
Whitefield & Jefferson R. R. .....(*See Boston & Me. Mass.*)
Whitneyville & Machiasport R. R. .....8 m. 2 lo. 48 c.
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Williamstown & Lake Ry. .....(*See Del. & Hud. River.*)
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Windsor & Annapolis Ry. 4-8½ g. 130 m. 10 lo. 160 c.
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Wm. Vickery, *Supt.* .....Kentville, N. S.
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Wisconsin & Minnesota R. R. .....(*See Wis. Cen.*)
Wood River Branch R. R. 4-8½ g. 6 m. 3 cars.
L. M. Barber, *Supt.* .....Hope Valley, R. I.
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3 g. 3 m. 1 lo. 9 c.
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Y

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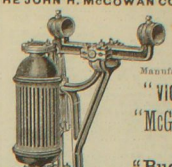

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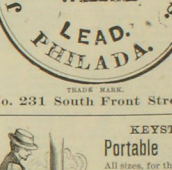

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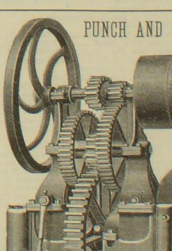

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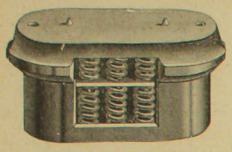

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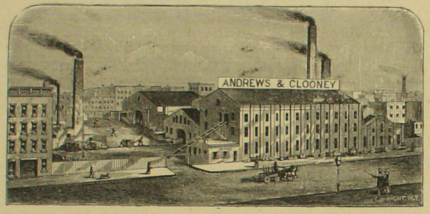

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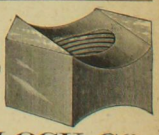

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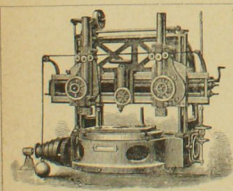

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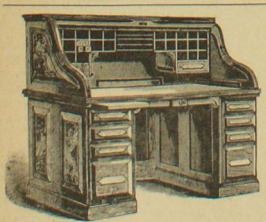

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